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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

JAMES W. WHITE, M.D., D.D.S.

Observe, Compare, Reflect, Record.

VOL. XXI.

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THE

DENTAL COSMOS.

VOL. XXI. PHILADELPHIA, JANUARY, 1879. No. 1.

ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 645, vol. xx.)

Enteric disease.—The sympathetic relations which exist between teeth and bowels are so strongly marked by the early symptoms of pathological first dentition, and are so forcibly impressed by the usual concomitants of a *fatal* "second summer," that it seems unnecessary to discuss the probability of inverse sympathetic action during the later years of life.

It is, however, usually quite difficult to distinguish with certainty between *cause* and *effect*, when, during middle life or advanced years, a combined dental and enteric irritation occurs.

During adolescence, as in infancy, the pathological eruption of teeth is usually so decidedly in advance of any systemic complications, that the dental difficulty is clearly accepted as the *cause* of trouble, and treatment is directed accordingly; but, as I have intimated, later in life it sometimes becomes quite questionable as to whether the condition of the teeth (which is usually one requiring very considerable dental attention) is producing a *symptomatic* diarrhœa or even dysentery, or whether an *idiopathic* enteric trouble is producing a symptomatic irritation of the teeth.

This is usually decided by the character of the pain, dentally, and the circumscribed (local) or diffused (general) nature of the irritation.

If the dental difficulty is antecedent to the bowel irritation, and is diagnosed as of local origin, and is of sufficient length of duration and severity of infliction to render it capable of producing sympathetic response, it is but reasonable to regard concomitant enteric derangement as purely *symptomatic;* a derangement which, dependent upon dental irritation, will be amenable to properly directed dental treatment.

On the contrary, if as the result of chronic diarrhœa (probably) or of acute dysentery (possibly) a *general tenderness* of the teeth is announced as a complication, and this complication is even more especially found existent in connection with the *peridental membrane*, and again, particularly, with those peridental membranes which *surround the roots of pulpless teeth*, it is but reasonable to infer that the dental difficulty is a purely *symptomatic* concomitant, due to that generally defective nutrition which would naturally result from long-continued or severe acute enteric disease.

Under such circumstances it is to be recognized that with the control of the *cause* of trouble, and with the restoration of the general health, all, of course, under charge of the general practitioner, no suggestions from the dentist would be required, other than, possibly, some such local applications as detergent and stimulant mouth-washes for the purposes of cleanliness, comfort, and prompt restoration of the parts to health.

Of these, I would advise the occasional rinsing of the mouth, as required, with phénol sodique and water (tepid or cool, as preferred); a half-teaspoonful, or even *much less*, to a tumbler of water, as found agreeable and beneficial.

I can also recommend as highly efficacious the distillations of Hamamelis Virginica (witch-hazel); of these I prefer Pond's or Humphrey's extracts,—one or two teaspoonfuls to a half-tumbler of water. Also, eau de cologne two parts, tincture of myrrh one part; of this, a half-teaspoonful to a tumbler of water makes a very pleasant and refreshing collutorium.

The addition of the salt, chlorate of potash, to this latter will frequently be found of very great benefit, in the proportion of a teaspoonful of the saturated solution to a tumblerful of the mouth-wash, or even stronger, if it is agreeable.

Other systemic diseases.—General tenderness of teeth (peridental) will also be sometimes found as a concomitant with various diseases of childhood and of more advanced periods of life. Of these I might mention particularly, measles (rubeola), mumps (cynanche parotidea), scarlet fever (scarlatina anginosa), and putrid sore throat (diphtheria).

In all these diseases, the irritation of the peridental membrane is purely symptomatic, or is due directly to contiguity with highly irritated tissues.

The treatment is, of course, only palliative, but even that often affords most desirable relief.

Soothing ointments to the jaws, neck, and cheeks; pain-obtundents, as lotions (externally), or as mouth-washes (as recommended under the head of *enteric disease*), are the *adjuncts* to ordinary general treatment in these cases.

XV. *Action of medicines locally.*—1. Arsenious acid. In consequence of the general acceptance of this medicament as the best agent for pulp-devitalization, and from the fact that I regard it as very important that the action of so powerful a remedy should be, as fully as possible, understood, I desire again to impress the need for great care in guarding against that peridental irritation which *may* arise from its improper application.

Indeed, I may go farther than this, and without any hesitation urge that the greatest caution should always attend its *proper* application, for I well recognize that even with this it is impossible always to so manipulate as to entirely preclude any untoward results.

As I have stated, when upon arsenical pulp-devitalization, I have frequently met with very unfortunate sequelæ following the use of arsenic; in many instances causing extensive and very painful ulceration of lips, cheeks, or tongues; in several instances resulting in periodontitis, death of the peridentium, and, necessarily, in loss of the tooth, and in one instance eventuating in the loss of three teeth and the surrounding tissues.

These latter serious complications have always been due to the *local action* of arsenious acid in directions where it was not, by any means, intended that it should reach.

It is not generally appreciated that an almost infinitesimal amount of the ordinary dental arsenical paste is *capable* of doing a serious amount of injury, and that, for this reason, its application should be most exact; the quantity employed should be the least possible consistent with the work required of it, its secure covering should be perfectly attended to, and any surplus escaping from the cavity of decay should be carefully gathered up by means of cotton pellets or bibulous paper, and the parts touched by it (especially the margins of gum) be moistened with carbolic acid or creasote.

2. Phosphorus—phosphorous oxide. In assigning this place to this excitant to periodontitis, I have chosen it with especial reference to the position it actually occupies as a *disputed* local or systemic irritant.

I have, however, classified it under the *local*, from the opinion, which I hold, that the weight of observation and testimony seems to indicate that some avenue to the peridentium through carious teeth or crownless roots is *essential* to the development of *phosphor-necrosis*, as the result of phosphorous devitalization of the maxillæ is termed.

That an exposure to the fumes of phosphorus for many hours of each day would decidedly predispose to almost any of the baneful results of anæmia, is readily admitted, and that the peculiar effects of this particular poison may as decidedly predispose to this particular form of disease is not denied, but I nevertheless cannot, as yet, accept the view that phosphor-necrosis has much analogy with such markedly systemic poisoning as that incident to mercurialization.

It is true that many of the symptoms of the two conditions are *identical:* the positive localization; the absence of an amount of suffering in any degree commensurate with the great and extensive deviation from normality; the peculiar "puffiness" given to the general expression; the constant and profuse flow of saliva, and the heavy systemic drain, are examples of these; but the *distinctive* features and results are quite as impressive; the "salivation" of phosphor-necrosis is a decided *sequence* to serious lesion,—that of the mercurials is as decided an *antecedent* to serious lesion,—*if any occurs;* phosphorus acts upon the organic portions of the jaw-bones, causing death of *the bone*, and leaving sequestra, much the same as any other local irritant,—differing, seemingly, only in degree,—*generally* producing graver results, but *sometimes even less*, than a putrescent pulp; mercurials act upon the membranes upon which the bones depend largely for nourishment; phosphorus seems to *require tangible direction* in order that its results shall be produced, and proper care against exposure during wounded conditions of jaws, and proper attention in regard to the filling of carious teeth and the removal of roots, seems an almost absolute preventive to trouble; the mercurials not only require *no direction*, but in despite, often, of the most vigorous efforts, find their destination and produce their most deplorable results.

The results of phosphor-necrosis seem to be comparatively easily circumscribed by the resistance of vitality,—even being limited to the more cancellated portions of the bones which it attacks,—and the recuperative efforts of the surrounding tissue (periosteum) are something remarkable, reproducing the destroyed osseous structures in extraordinary degree, and leaving the patients in *apparently* as good condition as before the disease, minus only the teeth.

The results of mercurialization are fearful to contemplate, and the deformity is sometimes horrible.

For the study of the subject proper of *phosphor-necrosis*, pertaining as it does to *oral*, rather than to *dental* pathology and therapeutics, I would refer the reader to the very able article upon the subject by my friend, Professor Garretson, in his work upon Oral Surgery.

XVI. *Action of medicines systemically.*—Mercurials.—The various preparations which are derived from the metal *mercury* (quicksilver) have, for so many years, performed such an important part in the therapeutics of both allopathic and homœopathic medication, that general popular ideas in regard to them exist in almost every homestead.

Blue-mass, calomel, and mercurius vivus are names as familiar as most of the ordinary articles used for food, and exaltation of their virtues and execration of their baneful effects are about equally heard as the popular verdict.

The latter medicament possesses the advantage over the others, that those who concede to it *no virtues* accuse it of *no harm*, while even those who best *know* the virtues of the former are equally aware of their injurious capabilities not only when used injudiciously, but sometimes even when administered as directed by acknowledged experience and good judgment.

So popularized has this knowledge become that the term "salivation" is regarded by the masses as *always* referring to a result produced by a *mercurial*, and "ptyalism" is almost equally regarded in the same manner by those professionally educated.

It should therefore be recognized that *ptyalism* or *salivation* is merely an excessive flow of saliva, from whatever cause, and that, in connection with *mercurialization*, we have *mercurial ptyalism* as one of the signs of *thorough mercurialism.*

It is, however, in a degree less than as salivants that the mercurials act as excitants to periodontitis, for marked tenderness of the teeth upon occlusion, together with decided sense of elongation, are frequent concomitants with the first "*coppery* taste" which is so diagnostic of the systemic impression produced by these medicines.

The gradation from this condition to that of decided mercurial salivation is usually quite rapid, during which the general peridental inflammation seriously augments, accompanied with considerable pain, swelling of the tongue, redness, and subsequent whiteness of the gums, constant flow of saliva, and marked fetor of the breath.

The complete absence of *relativity* between the size of the dose and the effect produced in mercurialization is well worthy of note, as great care and *watchfulness* are likely to accompany the knowledge that while large and frequent doses of any of the mercurials will sometimes be inadequate to produce even *desired* results, small and infrequent doses will possibly give rise to the most unfortunate sequences; indeed, it often appears as though safety resided in the larger dose, it acting as its own corrective by inducing purgation.

But no reliable guide in this matter has, as yet, been afforded, and, as I have intimated, I have had some of the worst mercurializations which I have ever been called upon to treat resulting, as I have been informed, from the administration of not more than two or three one-grain doses of calomel.

As I have said, the effects dentally and orally of excessive mercurialization are deplorable indeed; not only are the teeth lost, as in phosphor-necrosis, but the entire maxilla and much adjacent tissue is frequently destroyed.

The cicatrization which follows attaches the cheeks to the lips, destroys all facial contour about the jaw portions, may close up, almost completely, the opening to the mouth, necessarily precludes mastication, and even renders deglutition, of any other than the softest food, impossible.

I have quite a collection of the sequestra from mercurialization, and it is quite worthy of note that even these medicines, with all this destruction of tissue, pass the teeth by *untouched.*

I have long combated alike the fallacy of the medicinal *decay* of the teeth, and of the analogy between the action of acids upon teeth and the progressive peculiarities of *dental caries,*—and I would here state that although teeth are *lost* by the score through the agency of mercurials, they are yet *not decayed* by these medicaments; but if decayed, are lost decayed, and if sound, are equally lost *sound.*

They are lost, *as teeth*, through inflammation and death of the peridentium, or as accessories to the maxillæ through inflammation and death of the periosteum.

Secondary mercurialization.—It is admitted that an individual who has once been decidedly mercurialized is more than ordinarily liable to mercurial impression; but from the dental stand-point this possibility possesses peculiar interest.

I have had several cases of this kind, in which varying periods of from ten to twenty years elapsed between the two mercurial impressions; in every case a sufficient degree of mercurial ptyalism had been induced during childhood to eventuate in the loss of from four to ten teeth, these loosening and exfoliating sufficiently soon after ptyalism, and sufficiently simultaneously, to leave no doubt as to the probable cause for their so doing.

In every case, after a lapse of from ten to twenty years, an illness was diagnosed as "bilious fever," mercurials were employed in the treatment, and although in no instance was sufficient medicine given to apparently necessitate any particular supervision, and although in every case nothing serious was apprehended from the slight peridental irritation which supervened, yet this nevertheless increased and bid defiance to treatment until a number of permanent teeth were lost equaling in extent the ravages of the previous impression.

The *peculiar diagnostic sign* of this condition is the absence of ordinary causes for periodontitis and the presence of inflammation *on both sides of the median line.*

Usually in periodontitis, even of a central incisor, the median line marks the boundary of the inflammatory action to an extraordinary degree, but in mercurialization this line of demarkation is completely obliterated.

We have also the whitening of the gums (semi-aphthous) and a tendency towards the metallic taste and the fetid breath.

My "sheet-anchor" in combating mercurialization is chlorate of potash; by filling a vial half full of this salt and then filling it with water a saturated solution (one drachm to two ounces of water) is made; two teaspoonfuls of this solution (about eight grains of chlorate of potash) may be given in a tablespoonful of water from four to eight or ten times daily, according to the age of the patient and gravity of the indications.

A *frequent* rinsing of the mouth with this same solution, sufficiently diluted to be agreeably pungent, will aid materially in reducing the local inflammation, and an *occasional* use of a phénol sodique or permanganate of potash mouth-wash will desirably deodorize the breath and nicely cleanse the mouth, tongue, and gums.

(To be continued.)

THE DISTRIBUTION OF LIVING MATTER IN HUMAN DENTINE, CEMENT, AND ENAMEL.

BY C. F. W. BÖDECKER, D.D.S., M.D.S.

(Read before the American Dental Association, Niagara Falls, August, 1878.)

(Concluded from page 657, vol. xx.)

HISTORY.

It is not my intention to traverse the entire history of microscopical studies regarding the structure of teeth. I propose to quote only from representative writers on odontology, in order to show how the present theories on this subject have been gradually developed.

I quote from "The Natural History of the Human Teeth," etc., by John Hunter, 1778: "This substance (enamel) has no marks of being vascular, and of having a circulation of fluids: the most subtile injections we can make never reach it; it takes no tinge from feeding with madder, even in the youngest animals; and, as was observed above, when soaked in a gentle acid, there appears no gristly or fleshy part, with which the earthy part had been incorporated. In all these experiments I never could observe that the enamel was in the least tinged, either in the growing or formed tooth. This looks as if the enamel were the earth more fully depurated, or strained off from the common juices in such a manner as not to allow the gross particles of madder to pass. The other substance of which a tooth is composed is bony, but much harder than the most compact part of bones in general. We cannot by injection prove that the bony part of a tooth is vascular, but from some circumstances it would appear that it is so; for the fangs of teeth are liable to swellings, seemingly of the spina ventosa kind, like other bones; and they sometimes anchylose with the socket by bony and inflexible continuity, as all other contiguous bones are apt to do."

Joseph Fox, in "The Natural History and Diseases of the Human Teeth," 1814, says: "The enamel, when broken, appears to be composed of a great number of small fibers, all of which are so arranged as to pass in a direction from the center to the circumference of the tooth, or to form a sort of radii round the body of the tooth. This is the crystallized form it acquires some time after its deposit; by this deposition of its fibers the enamel acquires a great degree of strength, and this is not so readily worn down in mastication, nor so easily fractured by violent action of the teeth. The structure of the teeth is similar to that of any other bone, and differs only in having a covering, which is called enamel, for the exposed surface, and in the bony part being more dense. As bones in general are continually receiving nourishment from the vessels which enter into their substance, it may be justly inferred that the blood sent to the teeth affords a similar supply, especially as a considerable portion of animal matter enters into their composition."

Thomas Bell, in his "Anatomy, Physiology, and Diseases of the Teeth," 1831, says: "There are two distinct substances which enter into the composition of the teeth, essentially differing from each other in structure as well as in chemical composition; the one being organized, the other crystalline. The first, of which the mass of the tooth consists, is true bone; the second, which, from its appearance, is called enamel."

Alexander Nasmyth, in his "Researches on the Development, Structure, and Diseases of the Teeth," 1849, on "Cementum" says: "The cortical substance is always found on the peripheral part of the tooth, forming a layer of investment around it, and lying in close apposition with the enamel or ivory. The cortical substance is present in the teeth of all animals, though sometimes existing only in a rudimentary form. I have denominated the layer in question the 'persistent capsular investment.' The cortical substance has no organic connection with the enamel or ivory against which it lies, and being softer than both, is easily detached by means of a knife. It does not appear liable to decay like the other structures of a tooth, but is subject to removal by absorption. In its intimate structure it presents the characteristic corpuscles and canals of bone, the latter being filled with ossific matter, but otherwise resembling Haversian canals. It has been erroneously affirmed that its chief use is to form the bond of vital union between the denser and commonly unvascular constituents of the tooth and the bone in which the tooth is implanted. But a very superficial inspection will serve to prove that such a purpose cannot be fulfilled by the cortical substance; that no vital union, for example, can exist between it and the enamel, and as little between it and the ivory of the root of a tooth. I must repeat that there is no organic connection whatever between it and the other dental tissues; its union is merely one of mechanical contact, and its purpose purely mechanical."

On "Enamel" the same author says: "In structure, enamel is composed of cells which are arranged in regular rows, forming composite fibers placed at nearly right angles to the surface of the ivory, the original nuclei of the cells not being persistent. It has been stated by authors that an analogy subsists between enamel and bone, but I cannot yield my assent to this opinion. The structure of enamel is much more simple than that of other dental tissues, being in truth nothing more than a mass of cells arranged in rows, and fitted closely together, but held only slightly in contact by a thin web of membrane."

On "Dentine" this author writes: "It has long been known that the teeth are composed of two essential chemical constituents, namely, earthy salts and animal matter. To ascertain the relative proportion of these substances, I had recourse to my respected and distinguished friend, Dr. Thomas Thomson, Regius Professor of Chemistry in the University of Glasgow, a gentleman whose talent and indefatigable zeal in forwarding the interests of science are as justly appreciated as they are extensively known. From Dr. Thomson's analysis it appears that the quantity of animal matter is very considerable, and it is evident that it is contained chiefly in the fibers, or, as they have been termed, the tubes of the ivory. It follows, therefore, that the interfibrous or intertubular substance differs greatly in composition and physical properties from the fibers or tubes. When teeth are submitted to the action of acid for a period long enough to allow the earthy matter to be all taken up, I find that the animal residue consists of solid fibers, and if the decomposition be allowed to continue, these fibers present a peculiar baccated appearance. It was quite evident to me, from the examination of preparations, that the so-called tube was in reality a solid fiber, composed of a series of little masses succeeding each other in a linear direction, like so many beads collected on a string."

Richard Owen, in his celebrated "Odontography," 1840–45 (vol. i. pp. 302, 303, and 304), in describing the structure of dentine says: "The compartments of the basal substance, which I have called 'calcigerous,' or 'dentinal cells,' and which contain the hardening salts in their densest state, are subcircular, or subhexagonal. The calcigerous and nutrient tubes, varying from 1-10,000th to 1-20,000th of an inch in diameter, are placed with intervals equal to from two to six of their own diameters. They are nearly parallel to one another, both in their general course and curvatures, but as the outer surface of the tooth exceeds the inner one in extent, the tubes slightly diverge in their course and divide, decreasing in diameter to their peripheral extremities, and rapidly so near their terminations, where they become irregularly flexuous and often interlaced. The dichotomizing calcigerous tubes send off from their sides much more minute branches, which quickly divide and subdivide in the interspaces of the trunks and penetrate the dentinal cells."

On "Cement" this author says: "The cement, which, with the dentine, is present in all teeth of mammalian animals, is characterized, except where it forms an extremely thin layer, by the radiated calcigerous cells, usually arranged in lines or layers parallel with the surface of the cemental coat, and with each other."

On "Enamel" he asserts: "The enamel consists of more or less curved or wavy prismatic fibers, averaging about 1-4000th of an inch in diameter, and transversely striated."

John Tomes, "System of Dental Surgery," 1873, says of "Enamel": "The organic matter said not to belong to the class of gelatinous tissues, but to be closely similar to epithelium in its chemical relations, is stated not to exist between, but in the substance of the prisms (Hoppe-Seyler). The enamel is made up of parallel fibers, which lie in close contact with one another, no intervening substance being demonstrable. The transverse striæ are much more strongly marked in some than in others. The cause of this appearance of striation is still a doubtful question."

On "Dentine" he says: "In the crown of the tooth the dentinal tubes terminate by forming loops, or become too minute to be traced, or pass into the enamel and become lost. In teeth the dentine of which is imperfectly developed, the terminal branches are lost among, or end in, the minute cavities which abound in the layer at or near the peripheral surface of the dentine. Near the neck they stop short of the cementum, but towards the end of the root they not uncommonly pass into the cementum and connect themselves with the lacunæ. By the extension of the dentinal tubes into the enamel, and into the cementum, a connection is formed more intimate than mere superposition and adhesion of the one to the other would have established, and the more so, as the three tissues are developed from distinct formative elements. In preparations in which we are fortunate enough to retain a portion of the pulp with the dentine, it may readily be seen that the soft fibrils are processes of the cells known as ‘Odontoblasts,’ which constitute the peculiar layer called the membrana iboris. It is absolutely certain that no structures other than nerves have the power of conducting sentient impressions, and hence it is not quite necessary to assume that the dentinal fibers are actual nerves before allowing them the power of communicating sensation. The greater degree of sensitiveness observable in the dentine immediately below the enamel—that is, at the point of ultimate distribution of the dentinal tubes, and consequently of their contents—may be fully accounted for on the supposition that the latter are organs of sensation, the highest sensibility of which is confined to their branches. In the present state of our knowledge, the question cannot be regarded as capable of being definitely settled; this much only is certain, that sensation is conveyed by some soft contents of the tubes: whether by the fibrils or by something else, cannot be positively stated. In the fresh state the cavities (interglobular spaces) are not empty, but occupied by formed matrix, which has not been as yet calcified. In a well-developed tooth a certain number of the dentinal tubes will be seen to pass across the line which marks the junction of the enamel and the dentine, without suffering any increase in size, and after proceeding a short distance in the former tissue, become extremely minute and are lost. But in teeth of less perfect organization the dentinal tubes, after passing into the enamel, become suddenly dilated into comparatively large elongated cavities, somewhat irregular in outline, but tolerably uniform in their direction. Without following closely the course of the enamel fibers, they have a general direction towards the surface of the tooth, and terminate abruptly after advancing but a short distance into the substance of that tissue.”

On “Cementum” Mr. Tomes says: “The canaliculi of neighboring lacunæ anastomose freely with each other, and establish a net-work of communication throughout the whole body of the cementum, and occasionally become connected with the terminal branches of the dentinal tubuli. It is to the description of primary bone that the cementum of the teeth is most closely allied, and from that it is difficult to point out any distinguishing structural character. The transparent homogeneous processes, forming the reticulum, may be seen in many places passing in through the osteoblast layer, and may be traced passing without any interruption into the matrix of the cementum.”

Charles S. Tomes, in his “Manual of Dental Anatomy,” 1876, says on “Enamel”: “In perfectly healthy human enamel the fibrillar arrangement is not so very strongly marked; the fibers are solid, are in absolute contact with one another, and have no demonstrable intervening or uniting substance, or else interspaces would be left, which is not found to be the case. If dilute hydrochloric acid be applied to a section of enamel, the axial parts of the fibers are first attacked and are dissolved away, so that, if the section be transverse, a fenestrated mass remains. Cavities of irregular form sometimes exist in the enamel near to the surface of the dentine, and when such spaces exist, the dentinal tubes sometimes communicate with them; but these are to be regarded as pathological. In man, however, dentinal tubes may occasionally be seen to enter the enamel, passing across the boundary between the two tissues, and pursuing their course without being lost in irregular cavities, though this appearance is seldom to be seen."

On "Dentine" he writes: "Each dentinal tube runs outwards in a direction, generally perpendicular to the surface, towards the periphery of the dentine, which, however, it does not reach, as it becomes smaller, and breaks up into branches at a little distance beneath the surface of the dentine. The tubes have definite walls, and are not simple channels in the matrix. These walls are composed of something singularly indestructible. Indeed, the walls of the dentinal tubes are so indestructible that they may be demonstrated in fossil teeth, in teeth boiled in caustic alkalies, or in teeth which have been allowed to putrefy. Similarly indestructible tissues are, however, to be met with surrounding the Haversian canals and the lacunæ of bone. Each canal is occupied by a soft fibril, which is continuous with the odontoblast cells upon the surface of the pulp; the existence of these soft fibers was first demonstrated by my father. In the dentine, then, we have (I.) a matrix permeated by tubes; (II.) special walls of these tubes, or dentinal sheaths; and (III.) soft fibrils contained in these tubes, or dentinal fibers. On the matrix there is little to be said. It is absolutely structureless, save where 'interglobular' spaces exist, their contents having the structural arrangement of the rest of the matrix,—that is to say, the dentinal tubes pass across and through them without any interruption or alteration of their course. The exact nature of the contents of the interglobular spaces is not very certain. The dentinal tubes as they pass outwards often divide into two equally large branches; they also give off fine branches, which anastomose with those of neighboring tubes. In the crown of a human tooth these fine branches are comparatively few, until the tube has reached nearly to the enamel, but in the fang they are so numerous as to afford a ready means of distinguishing whence the section has been taken. The small branches above alluded to are given off at right angles to the course of the main tube, which, however, itself frequently divides and subdivides, its divisions pursuing a nearly parallel course. Owing to their breaking up into minute branches, some of the tubes become lost as they approach the surface of the dentine, and apparently end in fine-pointed extremities. Some terminate by anastomosing with terminal branches of others, forming loops near to the surface of the dentine; others terminate far beneath the surface in a similar way. Some tubes pass into the small interglobular spaces, which constitute the 'granular layer' described by my father, while others again pass out altogether beyond the boundary of the dentine and anastomose with the canaliculi of the lacunæ of the cementum. The enamel also may be penetrated by the dentinal tubes, though this, when occurring in the human subject, must be regarded as exceptional and almost pathological in its nature. Of the real nature of the dentinal fibrils some doubts are entertained. They are certainly processes of the formative cells of the dentine, and their substance seems identical with that of the protoplasm of the cell. Nerves, in the ordinary sense of the word, they are not, and have never been supposed to be. Be that as it may, there can be no question that the sensitiveness of the dentine is due to the presence of soft organized tissue in the tubes. The cementum, in my opinion, is present in a rudimentary condition upon the teeth of man, etc., as Nasmyth's membrane. It consists of a calcified matrix or basal substance, to a slight extent laminated, and lacunæ. It is sometimes apparently structureless, at others finely granular or interspersed with small globules. Many of the lacunæ in cementum are connected, by means of their canaliculi, with the terminations in the dentinal tubes; they by the same means freely intercommunicate with one another, while others of their processes are directed towards the surface, which, however, in most instances, they do not appear to actually reach. In the fresh condition it appears probable that the lacunæ are filled up by soft matrix, which shrinks up, and so leaves them as cavities in dry sections. It can hardly as yet be said that the question of the contents of the lacunæ has been finally settled."

Carl Wedl, in his "Pathology of the Teeth," says: "Isolation of the enamel fibers may easily be effected by means of dilute hydrochloric acid. The fibers becoming swollen and varicose, present on the depressed portions an apparent transverse striation, and between the opposing contiguous portions narrow fissure-like intervals remain, which have given rise to the view entertained by some investigators that canals are found in the enamel. The junction of the enamel with the dentine is effected by a transparent, irregular, wavy boundary layer, which in some parts is encroached upon by separate dentinal canals, and in others by elongated, cleft-like cavities of irregular shapes and different dimensions. Into these cavities, which are mostly filled with opaque, amorphous, calcareous masses, one or another of the dentinal canals frequently enters. The cement has an organic connection with the periosteum of the root or root-membrane. Sometimes the canaliculi radiate from the bone-corpuscles in parallel rows, and extend a considerable distance without forming a network. The dentine and cement are connected together by means of a layer composed of an agglomeration of transparent globules, and of varying degrees of thickness. The spaces intervening between the latter (inter-globular spaces) are irregularly notched, and frequently in very close proximity to one another; they are filled with an opaque, granular, calcareous substance, and very often are in direct connection on one side with dentinal canals, and on the other side with the bone-corpuscles of the cement. Sometimes this intermediate layer is very finely granular, and the spaces between the grains are exceedingly small. The cement proper commences outside of this layer, and its canaliculi rarely come into direct connection with the dentinal canals."

From W. Waldeyer (in Stricker's "Manual of Histology," 1872) I quote: "The chief components of dentine are a very firm matrix, analogous to compact bony tissue, and extremely fine, frequently branched, fibers,—the dentinal fibers of Tomes and Kölliker,—which occupy fine canals, the dentinal canals traversing the matrix. The dentinal fibers are enormously-elongated processes of the so-called dentinal cells, or cells of the dentinal pulp (odontoblasts). The dentinal fibers constitute the soft parts of the dentine. They do not lie in direct contact with the hard matrix, but are invested by a sheath,—the dentinal sheath of E. Neumann,—which is intimately connected with the matrix. As a general rule, each tube extends from the pulp-cavity to the enamel or cement, giving off, in its course, numerous delicate transverse branches. By means of these transverse branches both the tubes and their contents—the dentinal fibers—anastomose with each other. In regard to the mode of peripheric termination of the dentinal tubuli, no positive conclusion can be drawn. Yet exact information on this point is of considerable importance, because Tomes has directed attention to the sensibility of the peripheric portion of the dentine. It is not easy to decide whether the fibers are present in the finest peripheric ramifications of the tubules. A direct passage of the dentinal tubuli into the enamel does not occur. We may seek in vain, even in young dentinal fibers, for rudiments of nuclei, although both the history of their development, and several pathological appearances (as, for instance, those accompanying caries), might lead us to expect their presence. The contents of the inter-globular spaces consist of a soft mass. In the young, fresh teeth of the calf, rounded and stellate cells may frequently be seen in the larger inter-globular spaces, with processes which extend into the dentinal canals opening into them. At a latter period the cells atrophy, or their protoplasm becomes converted into a substance analogous to the dentinal cartilage."

On "Enamel" he says: "It consists of rather elongated prisms, of about 3 to 5 mm. long, which are called enamel fibers, or enamel prisms. The dark transverse striæ and slight varicosities, which, especially after the addition of very dilute hydrochloric acid, occur at regular distances from one another in the isolated prisms of enamel, are very remarkable. If the treatment with hydrochloric acid be continued for some time longer, the fibers split, in the direction of the clear transverse lines, into small cubic fragments of nearly equal size, 3 to 4 mm. The enamel fibers lie in close contact with each other, without any demonstrable intervening substance. The cuticula (persistent capsule of Nasmyth) forms an extremely resistent investment, not more than ½ mm. in thickness, covering the external portion of the teeth, and disappearing wholly when they are mature. When the enamel is present, the under surface frequently presents the impression of prisms in the form of small, square areas."

On "Cementum" he asserts: "The cement is a true bony structure essentially belonging to the periosteum of the alveolus, and in man and many vertebrates forms a thin investment of the fangs of the teeth. Both in its chemical and microscopical characters, cement is closely allied to bone. The lacunæ are for the most part large, and possess an enormous number of very large canaliculi, especially in the cetacea. When the cement is extremely thin, however, they may be entirely absent, and it then presents on section a perfectly homogeneous and vitreous appearance. A similarly very hard lamella, destitute of lacunæ, occurs also in the outermost portion of the thick layers of cement. Haversian canals, which sometimes open into the pulp-cavity (Salter), are found when the cement is thick, though it is rare to find any lamellated arrangement of the matrix. Kölliker has described peculiar cavities in the cement, which he considers to result from pathological processes."

E. Magitot, in his "Treatise on Dental Caries," 1878, says: "The dentine is bounded throughout its whole external surface by a continuous layer of dark granulations, very numerous and of various form. This granular layer, subjacent to the enamel and cement, was taken by Retzius and J. Müller for a mass of bony corpuscles, in which terminated the canalicules. But an attentive examination shows that although the granulations are continuous with the terminal extremities of the canalicules, we cannot compare them to osseous corpuscles, but that they should rather be regarded as minute pits sunk in the thickness of the ivory, at its exterior limit, to aid the communications between the tubules which permeate this tissue.

Therefore we have proposed to call this granular layer the anostomotic plexus of the dentinal canalicules, meant to permit a free course to the fluids of imbibition, and thus to favor the organic movement. What proves this is that the aspect under which these cavities present themselves is the same as that of the canalicules. Thus, when these latter are filled with a liquid which renders them white and transparent, the little cavities are white and transparent, and they become dark and opaque when the tubules, filled with air, show the same color. Moreover, it is easy, by changing the focus of the microscope, to see that the two communicate freely with each other. This granular layer has long been noticed. This it is that represents the vestige of membrane between the ivory and the enamel which Cuvier thought he had discovered. During life the dentinal canalicules inclose a transparent, colorless fluid, containing, according to Hannover, calcareous matter in solution. This fluid is probably intended to effect the organic movement in the internal portion of the tooth; this is, at least, the logical conclusion, although no experiment gives us any direct demonstration of the fact. It has, indeed, been held by some that this liquid possesses a continuous movement throughout the whole substance of the ivory, but other authors have denied this circulation. As for ourselves, we are much disposed to believe that this liquid, charged with materials of nutrition, bathes the canalicules through their whole extent, and accomplishes the double movement of assimilation and dis-assimilation, thus setting up a certain exchange, slow, indeed, but yet aided by the very disposition of the canalicules and their multitudinous anastomoses. The teeth contain no trace of either vessels or nerves, and as for the other cavities which we sometimes find in the body of the dentine, they appear to result from arrested development or from imperfect calcification; therefore they must be considered only as faults of conformation. These are without doubt the cavities, always minute, already remarked by Czermak and Hannover, which have been regarded by Tomes as Haversian canals, and by other authors as internal caries. For a long time there has been attributed to the ivory a sensibility of its own,—an opinion still held by many, even in the admitted absence of nerve-branches, and supported by the fact that the teeth vividly perceive the impressions of temperature, of acids, etc., and distinguish the physical qualities of bodies submitted to their contact, such as grains of sand and hairs. This tactile sensibility, in fact, does not belong to the ivory, and must be attributed to the extreme facility with which this substance receives the least vibrations, the slightest disturbances which are given to it by external influences, and transmits them to the pulp, whose tissue, extremely rich in nerves, fills exactly its solid shell, and thus perceives the smallest impressions communicated to it; moreover, it varies in intensity in different portions of the dentinal tissue. In the vicinage of the pulp it is naturally very vivid, in consequence of the ready transmission of the impressions received; it diminishes progressively as we go from this point, to become again excessive at the border of the gray layer, or seat of the anastomotic cavities. This peculiarity permits us to attribute to the wall proper, which envelops the canalicules and their anastomoses, some part in the production of the phenomenon. This membrane, covering, in fact, a canal permeable through the whole extent of the tissue, is more susceptible than the ivory itself of transmitting, by means of motion or vibration, external influences, and there, at the point where this membrane is most expanded, this sensibility is found to be most acute."

Of the "Enamel" he says: "The layer of enamel surrounding the crown is composed of an infinite number of rods, prismatic by reciprocal pressure, whose length is just equal to the thickness of the tissue at the corresponding point, and intimately united without the interposition of any other substance."

THE "NEW DEPARTURE."

As Viewed in its Relation to Soft Gold as a Filling-Material.

BY GEORGE W. WELD, D.D.S., NEW YORK.

To give force and character to an argument, especially when the question is a public or professional one, demands that qualification which is the outgrowth of age and experience. Thus it is when a young professional man enters the arena of debate he stands the chances of being called egotistic or inexperienced. So I would prefer, as a junior, to address a few remarks to the younger members of the profession.

We were taught to fill teeth with cohesive gold as being the best, nay, the only material for general use. We accepted the creed of our clinical teachers; we could not reasonably do otherwise. Adhering to that creed, we have labored faithfully, with varied results. Today, however, we are at "cross-roads" confronted in large and conspicuous type with "New Departure."

Now, as students educated in the theory of heavy malleting and cohesive gold, and taught to surrender whatever innate ideas we may have possessed concerning the merits of soft gold and plastic materials for preserving the teeth, it is but natural to hesitate when called upon to adopt the "basal principles" of a new creed, and to inquire which is to govern us in our future practice.

The theory and practice which we are asked to adopt are so radically in opposition to the present theory and practice and the clinical teachings which have thus far guided us, that it seems *either* that cohesive gold as a filling-material for arresting decay and preserving the teeth has failed, or the theory which prescribes the use of plastic materials is wrong in principle. That there may be merit in both theories under proper and definite conditions is not to be doubted; but for universal practice, two theories so diametrically opposed cannot be reconciled. I believe that the older members of the profession—they who have never given up the use of soft gold and wedge-pointed pluggers; they who have accepted and make use of cohesive gold, the mallet, and serrated points (but only for certain definite cavities); they who make judicious use of tin, gutta-percha, and other plastic materials—are eminently better qualified to preserve teeth than younger members who make use of cohesive gold as a standard filling-material.

I am inclined to believe that there is more merit in the plastic principles of the "New Departure" than, for the present, will be admitted by the devotees of the mallet. Yet, I am not opposed to the use of cohesive gold in its proper place. I am confirmed in my belief that there is as much difference between soft and cohesive gold, so far as their effects upon tooth-bone and their manipulation make a difference, as there is between tin and gutta-percha; that is, the successful use of either necessitates as great a distinction, in different cases, to insure satisfactory results. This great difference between these two preparations of gold seems to have been entirely ignored by the authors of the "New Departure." Surely they are not unacquainted with it; and there would be poetic justice in demonstrating the character and usefulness of soft gold as one of the *plastics*. It is a lamentable fact, however, that soft gold is with many a mere matter of history. I venture the assertion that there cannot be found twelve students or practitioners in the United States to-day under thirty years of age who have any definite knowledge of the use of *soft gold* and *wedge-pointed pluggers*, and I advocate the use of one only in association with the other. The demonstrators in most of our colleges ignore soft gold altogether; look upon it as being unworthy of serious consideration; many of them could not teach its use, and know nothing of its practical advantages over cohesive gold in a majority of cases.

It seems strange that the profession at large should have accepted cohesive gold as a filling-material for general use and discarded soft gold, remarkable as it is for its malleability.

With the decline of soft gold and the wedge-pointed pluggers there have come innumerable failures in gold fillings, until at last the profession is compelled to seek relief by accepting other materials possessing the same requisites for success that pertain to soft gold. Hence the "New Departure," whose origin may be traced back step by step to the acceptance of cohesive gold by the profession as the best filling-material for general use. Cohesive gold is undeniably the most difficult to manipulate of all filling-materials; its very name and character being suggestive of defective manipulation; while soft gold for cavities suited to it is nearly as easy and quick of manipulation as tin or gutta-percha, and if more expensive, is more durable, and pre-eminently better able to withstand the action of acids and oxidation. Moreover, the hardness of cohesive gold and the abuse of power with the mallet tend to destroy the marginal walls of soft and chalky teeth.

That there is merit to be attached to the principles advocated in the "New Departure" will soon be admitted by a majority of the profession. Many have already admitted it. But how one of its adherents, knowing how to use soft gold, can come before the public with "no gold used" for a motto is beyond my comprehension.

It is said that a philosophy is not worth the having unless it may be tabulated. If the results of filling teeth with soft gold cannot be tabulated, it is certainly not for the want of opportunity nor for the lack of virtue in the material. I have in my own teeth unimpeachable evidence for soft gold,—its permanency and durability,—which has set at rest, in my own mind, all question as to its superiority over any other filling. I am satisfied that no plastic material in use to-day could have fulfilled the same requirements or produced the same happy results.

I know a lady whose teeth were filled with soft gold by a dentist (now deceased) in Philadelphia over forty years ago, and her teeth, though of a soft and chalky character; will be found still well preserved. I have in my cabinet a tooth (lost by absorption of the process) containing a soft gold filling, which preserved the tooth from further decay for a period of thirty-eight years; the filling being nearly as perfect as it was the day it was inserted.

Testimony in behalf of soft gold is also furnished by older and more experienced practitioners than myself, and by thousands of patients whose teeth have been permanently preserved by soft gold. I might mention the names of Harwood and the Tuckers, of Boston; Dunning, Lord, and others, of New York, who have ignored amalgam and made general use of soft gold in their practice. Such operators can more easily dispense with amalgam and other plastic material than those who use only cohesive gold. And while it may be true that a majority of their fillings are not brilliant as to high polish, they will bear inspection, even as to finish, with less excess of filling-material, less splitting of the enamel, less opportunity for lodgment of moisture at any point of the circumference of the filling, and, above all, less decay and less reason for supposing there is any electro-chemical action existing between the gold and the dentine.

The "New Departure" practice claims "that for certain definite kinds of teeth and for certain definite places for which at present gold is regarded as *the best*, other materials are better than gold." Without rejecting this claim,—which in nowise conflicts with the use of soft gold, but, on the contrary, we accept it to this extent, and commend it to the consideration of those who adhere to the exclusive use of cohesive gold,—I would amend and modify the new and old creeds as set forth by Dr. Flagg so that they might read as follows:

Accepted Creed. *Clinical Teachings.*	New Departure Creed.
I. *Cohesive gold* is the *best* material with which to save teeth.	I. In proportion as a *certain* class *of teeth* need saving, cohesive gold is the *worst* material to use.
II. *Contour fillings* prevent decay, and thereby render the fillings more permanent.	II. *Contour fillings* often favor decay, and thereby render the fillings less permanent,—*separating and self-cleansing spaces essentially important.*
III. "Failure in operations is mainly due to defective manipulation."	III. Failure in operations is mainly due to want of adaptability of cohesive gold with tooth-bone and to defective manipulation.
IV. "A tooth that is worth filling at all is worth filling with gold."	IV. "A tooth that can be so treated as to be satisfactorily filled with *anything* is worth filling."
V. "Gutta-percha *properly used* is good enough for *temporary* fillings."	V. "Gutta-percha *properly used* is the *most permanent* filling-material we possess."
VI. "A *good* gutta-percha filling in its proper place is better than a *poor* gold one."	VI. A *good* gutta-percha filling in its proper place is better than a *good* gold one.
VII. "Amalgam *per se* is a poor filling-material."	VII. Amalgam *per se* as a filling-material for *preserving* teeth is no worse than cohesive gold or gutta-percha *per se.*
VIII. "The use of plastic filling-material tends to lower the standard of dentistry, thereby diminishing its sphere of usefulness."	VIII. The use of plastic filling-material tends to raise the standard of dentistry and increase its sphere of usefulness.

The omission of the fifth and sixth articles does not materially affect the principles of the "New Departure" creed. While I indorse all that has been said in favor of plastic materials, when used in "certain definite places," I maintain that the same reasons which call for an extended use of plastic materials in preference to gold, apply with equal force to a better appreciation and a more extended use of *soft gold* in preference to *cohesive gold.*

In an article published in the DENTAL COSMOS (May, 1878), I stated that soft gold was more compatible, and would take a better impression of the cavity-walls than cohesive gold. This statement was questioned by Dr. Chupein, and in the issue for July, 1878, to disprove it, he resorted to the following experiment: "Taking a piece of No. 4 soft foil (Quarter Century), we folded it on itself very smoothly some sixteen times, of which we made two squares. Laying a half-dime on a table, we placed the square of non-cohesive foil on it and applied pressure with the ball of the thumb. The other square we thoroughly annealed and then subjected it to the same pressure. The result was, the annealed square showed a much sharper impression than the other, the difference being plainly perceptible by the naked eye, and much more apparent under a magnifying-glass." This experiment proves nothing, and in nowise conflicts with what was written upon the relative impressibility of these two preparations of gold, as the writer will on reflection, I think, cheerfully admit.

If we carefully fold together sixteen pieces of cloth in two squares, having one square *sized*, the other soft or *unsized*, and resort to the same experiment, we shall invariably find that the square of sized cloth will take a much sharper impression than the square of *soft* or unsized cloth. But if we should attempt to manipulate these two kinds of cloth in cavities, restricted in size and shape, we would find that the adaptability was *very much* in favor of the soft cloth.

The annealing of gold materially changes its character; it differs from soft gold as sized cloth differs from unsized or soft cloth. Thus it is that when sixteen pieces of gold are carefully folded upon themselves, *annealed* and *condensed*, we have in reality no longer sixteen pieces, but only one piece increased in thickness sixteen times, and therefore more capable of taking a sharp impression, because of a certain consistency essential in all impression-material. And to this fact may be attributed the sharper impression which *condensed annealed gold* shows over *uncondensed soft gold.* It can be argued with as much reason that cohesive gold takes a better impression than gutta-percha, which readily adapts itself to the cavity-walls without the necessity of very much pressure. But gutta-percha answers for all practical purposes, so far as its union with the wall of a cavity is concerned, with the same advantage in manipulation possessed by soft gold, viz., the pluggers never come in contact with the tooth-bone.

Thus far I have endeavored, imperfectly, perhaps, but as well as my experience and knowledge permit, to note the difference existing between soft and cohesive gold, and to draw a line in favor of plastic materials, which shall include the use of soft gold as a standard filling-material.

I desire now to touch upon another point in connection with this subject, which at present seems to agitate some minds, and to hover like a bird of evil omen around all operations in which gold is used: the *electro-chemical action* supposed to exist between gold and tooth-bone.

Are there any good reasons for supposing that an *electrical action* exists between gold and the dentine?

Before attempting to answer this question let us inquire: First, how long is it since teeth were supposed to decay from *electrolysis?* Second, have soft gold fillings ever been known to produce decay from electrical action? If they have not (and I challenge *any one* to prove that they have), then the existence or the supposed existence of electro-chemical action dates from the time that cohesive gold was introduced to the profession as a filling-material. Now, the conducting power of a soft gold filling—if we accept the facts as to the conducting qualities of metals, *before* and *after tempering*—is greater than that of a filling made of cohesive gold. So that, if soft gold fillings have always been free from electrical disturbance, cohesive gold fillings must be equally as free, at least; and the idea that the decomposition of bone arises from electrical action is a delusion, and we must look to other sources for the true cause.

Now, as a matter of fact, was soft gold, *before* the use of cohesive gold, the mallet, and serrated points became general, looked upon by the profession as capable of decomposing tooth-bone from electrical action? If it was, the fact has certainly not been recorded, and I have yet to hear of a single instance where decay around a soft gold filling was ever attributed to electrical action.

That fillings of cohesive gold will in "certain definite places" be more likely to give trouble than fillings of soft gold, I have not the least doubt; but this is attributable to imperfect manipulation and the lack of a thorough adaptation of the gold to the walls of the cavity, which allows for chemical action and subsequent decay, and not to electrical influence.

Mr. James E. Dexter, in speaking of this question before the New York Odontological Society, in the discussion of a paper entitled "Systemic Electricity" (see *Dental and Oral Science Magazine*, August, 1878), says the "received opinion of electricians is, that all electrical action is caused by—is the result of—chemical decomposition. This implies that chemical decomposition must precede electrical disturbance. Therefore there cannot be electrical action without previous chemical action. How chemical action, in its turn, is excited I do not pretend to say; but it appears to me rather a hasty assumption to claim in the face of all the proof to the contrary, that electrical force is, primarily, that excitant." If, then, after a long and thorough trial, soft gold was never even suspected of causing electrical action, is it reasonable to assume that cohesive gold, a material possessing conducting qualities to a less degree, gives rise to electrical action? Is it not more in harmony with facts, so far as known, to believe that it is chemical action alone that causes decay, and that electrical action, if it does exist, is of only secondary importance? It is well known that the action of a voltaic arrangement depends upon the nature of the fluid as well as upon that of the solid element. Thus we find that when the electrodes of a voltaic battery are brought near to each other in certain liquids in obedience to certain laws, decomposition ensues.

Mr. Dexter stated emphatically, however, that "a piece of copper wire *wholly submerged* in the acid, so as to entirely prevent any portion of the metal from coming into contact with the air, *remained for many months without imparting the slightest tinge of color to the liquid;* but, on suffering the fluid *to evaporate, the instant the slightest portion of the metal became exposed to the atmosphere chemical action commenced.*"

If we admit that the gold and dentine are susceptible to polarization, we must then have the presence of the atmosphere in conjunction with the oral fluids to complete the conditions necessary to *electro-chemical action.* It is questionable, however, if a majority of fillings, to say the least, inclosed, as they are in the mouth, covered, as they are, constantly with *moisture*, and often with fluid, are sufficiently exposed to the atmosphere, which in its normal state is electro-positive, to become *polarized.* But the existence of electrical action is one thing; its existence to a sufficient degree to cause *chemical action* and the decomposition of bone is another, and a far different thing. That there is a *chemical action* which destroys bone is not to be disputed; but other and more convincing proofs than those which now exist, must be produced to demonstrate that *electricity*, so far as it can be associated with *any metal* for filling purposes, serves to decompose tooth-bone.

Mr. Dexter further says: "Much has been spoken and written by the advocates of the 'New Departure' which will not, it seems to me, stand the test of experiment and law; and many experiments have been made and promulgated which, to me, often prove more powerful arguments against, than for, the positions they are intended to sustain."

Mr. Dexter touches the point of greatest importance, however, when he says that "the one indispensable condition is *that there shall be no lodgment for moisture at any point of the circumference of the filling.*" It is just at this point that most of our trouble begins. The general excess of filling-material gives rise to more decay around the fillings than perhaps any other cause. All this can be attributed to the use of cohesive gold, which, except under certain favorable conditions, generally forbids a thorough and perfect finish. It would seem, therefore, that it is defective manipulation which gives rise to decay around gold fillings, and not electro-chemical action, as claimed by the advocates of the "New Departure." But defective manipulation includes:

First. In a majority of cases the want of adaptability of cohesive gold with tooth-bone,—the adaptability being in proportion to the accessibility of the cavity.

Second. The abuse of the mallet and serrated points, which in many cases pulverize and destroy the marginal walls of the cavities.

Third. The error in principle, of directing that in all cases gold shall be impacted, and the cavity filled *longitudinally* with the bottom acting for a base, in preference to being filled *laterally* with the sides acting for a base.

Fourth. Imperfect finishing, and an excess of filling-material, which give room for the lodgment of moisture and acid secretions at different points of the circumference of the filling.

Let us accept the principles of the "New Departure" in so far as they recognize "that for certain definite kinds of teeth, and for cavities in certain definite places, other materials than gold are better than gold;" and that a tooth that can be so treated as to be satisfactorily filled with *anything* is worth filling. And while we give credit to the originators of the "New Departure" for a philosophical system for preserving teeth by an eclectic method, let us seriously reflect before we decide to give up that which has been weighed and *not* found wanting,—*soft gold.*

TOOTH-EXTRACTION AND ITS POSSIBLE RELATIONS TO THE PREGNANT STATE.

BY GARRETT NEWKIRK, M.D., WENONA, ILL.

Among the "Hints and Queries" in the Dental Cosmos questions sometimes appear in such form as seemingly to show an utter incapacity of the querist to comprehend the extent and scope of a proper answer. Solutions to many-sided and far-reaching problems are sought for in a simple yes or no.

In medicine, there has been a reaching out after *specifics*, something which should enable the physician to deal with intricate and ever-varying problems of life and death, not by inductive reasoning, but by the mathematical routine prescription of drugs. So, in dentistry, some are seeking exact specific rules of action for cases involving a great variety of considerations, by which the rules they seek are made impossible. Where circumstances alter cases so generally that no two can be precisely similar, where each requires a special study of itself in order to a correct understanding, too much caution can hardly be exercised in creating arbitrary rules.

In the February (1878) number of the DENTAL COSMOS "J. B. W." asked with reference to the facts as to the extraction of teeth for pregnant women. The only answer given was by some one who said that in a practice of over thirty years he had never hesitated to extract teeth for women in all stages of pregnancy, and, so far as he knew, without any unfavorable results; the inference from his answer being, that in considering the question of the extraction of any woman's teeth, it makes no difference whether she be pregnant or not.

From this conclusion I most respectfully dissent. Were a dentist considering that question with reference to a friend of mine, I should prefer that he would not take that view of it and act accordingly. I believe there *is* a difference—an important one—that ought to be taken into account, and which should exercise a conservative influence on our decision in these cases; how far will appear as we proceed.

In considering any operation or treatment proposed for the pregnant woman, there should be constantly borne in mind the intimate relationship which exists between the mother and the child, and the possible influences that may be exercised upon that relationship by the course proposed. We must remember that whatever affects the mother, whether of a physical or a mental character, may also affect the child, either favorably or otherwise.

The question for us to consider in this connection is, What may be reasonably expected as a probable or a possible result of tooth-extraction during pregnancy? Is this condition to be practically ignored? May it be in any instance the possible cause of a miscarriage or other injury?

The causes of miscarriage may be any kind of violence, direct or indirect, accidental or intentional; idiosyncrasy; disease of a general or local character, and reflex influences of an injurious nature, whether mental, moral, or purely nervous,—whether acting directly through uterine contractions, or indirectly through the circulation upon the fœtus.

It is with the last class that we are here principally concerned. It may be remarked in the first place that many abortions cannot be positively accounted for. An abortive habit (predisposition) exists in some cases, requiring only a slight cause to make it active. A woman may be the subject of an apparently slight disturbing cause, avoidable or otherwise, a misstep, a blow, an extra muscular effort, a fright, a shock, a mere surprise, an unusual emotion, a sudden pain, and soon thereafter a miscarriage follows. In a large majority of these cases, what the immediate exciting causes are can only be conjectured. All that we can say is that the mis-step, fall, surprise, shock, etc., ought to have been avoided. It must also be borne in mind that effects may be, and often are, produced that *are important in their character and yet come short of producing abortion.* There are children born that have been *almost aborted*, and many more that have been subjected to causes having an unfavorable influence upon their harmonious and healthy development.

There are certain nervous temperaments, certain idiosyncrasies and special habits, with reference to which, in the pregnant woman, it cannot be said with certainty that any considerable disturbing influence superadded will not produce bad results. An abortion may follow, or short of that, injury of some sort to the child. It is well, therefore, not to trifle under such circumstances, or we may some day be guilty of having produced mischievous results; certainly we take a risk, even though it be but one in a hundred,—one which we ought not to take except the circumstances absolutely demand it.

Now, what does tooth-extraction necessarily and possibly involve? Physically, it involves a solution of continuity of from one to three square inches of surface of living tissue; the sudden rupture of a large number of small blood-vessels, and from one to four nerves. Contingently, it may involve a fracture more or less extensive of bony processes, unusual suffering, or loss of blood. It produces invariably upon the conscious subject a sudden nervous impression,—*shock*,—varying from trifling to serious. Pain, for a moment almost unendurable; semi-involuntary, possibly violent movements and outcries, followed by faintness and nervous tremor, are the coincidents and sequelæ in some degree in a majority of cases. Additionally, there may be fear, fright, and occasionally, though rarely, uncontrollable anger.

The degree of shock likely to ensue may be in a measure anticipated by attention to the following considerations, viz.: the temperament; present state of health, especially as it pertains to the nervous system; the character, history, and present condition of the tooth in question; the state of the neighboring tissues, and the probable ease or difficulty of extraction. The mental condition of the patient should also be considered.

The order which temperaments bear to shock is about as follows: 1, the nervous; 2, nervo-sanguineous; 3, nervo-bilious; 4, nervo-lymphatic; 5, bilious; 6, lymphatic.

The condition of the nervous system at the time of an operation has a marked influence on results; that which may be well borne at one time, may at another be attended by severe shock, and followed by serious prostration. This fact is never more apparent than in the extraction of teeth. A want of sleep, severe pain (especially if paroxysmal), unusual emotion or excitement, severe illness or overwork, may produce a state of exalted nervous sensibility, or rather irritability, highly unfavorable for any operation.

As to the tooth itself, Has it an inflamed pulp? Is it dead? Is there alveolar trouble of any kind? Is it particularly sensitive to instrumental touch? Has it one, two, three, or four roots and nerves? Is the trouble of reflex, malarial, or neuralgic origin? Would much force be required in its extraction? Is it probably amenable to therapeutic treatment? These are some of the questions which may be asked with reference to such cases where extraction is proposed, and which ought to be correctly determined by the dentist before he assumes the responsibility of performing the operation. It is not to be looked upon as a trifling operation simply because it is so common. These questions, always proper, become of greater importance whenever the case in hand is that of a pregnant female.

I believe the following rules to be in the line of ordinary prudence. Where a choice has to be made between allowing the tooth to remain, involving odontalgia, severe neuralgia, antral or alveolar abscess,—conditions compromising the general health and comfort of the patient,—and the removal of the offender, the latter course is the proper one; but this is a contingency not often arising, and may usually be avoided.

If the operation seems to be inevitable, however, and the temperamental and other conditions are unfavorable, with undue nervous irritability, it would be better to modify these conditions, either by forced rest and sleep under an opiate previous to, or by partial anæsthesia at the time of extracting.

During the pregnant state certainly no tooth should be extracted to please the patient or her friends, or to prepare the mouth for artificial work. It should be only as a choice of two well-recognized evils, and then especial care should be exercised to avoid nervous impression as far as possible.

As the greater danger of miscarriage exists during the earlier months of pregnancy, more particularly the third and fourth, temporary treatment, protection or filling, should, if possible, be resorted to, if only for a few weeks.

Again, we all know that with certain timid people the sight of an operating-chair, of instruments, the touch of cold steel, or the sight of blood may, any of them, be sufficient to cause an almost insupportable condition of nervousness and dread. This is particularly true of females, and especially when *enceinte*. Hence the increased necessity for trying to avoid or to modify these disturbing causes. Under some circumstances it would be better for the dentist to visit the patient at her house, and extract the tooth with an instrument previously warmed and kept from her sight. Much nervous distress may in this way be avoided.

I have been thus careful to call attention to these well-known facts, because explicitness seemed to be demanded by the character of the question.

I do not think that any practitioner of dentistry should entertain the theory that the pregnant state is one that may safely be ignored, for I believe such a theory is full of possible dangers. Nor should it be forgotten that the question of miscarriage is not the only one involved in this matter. *Prenatal influences* are recognized by intelligent observers, both in and out of medical circles, as among the most important in determining the organic qualities of human beings, and more than usual care is exercised by sensible people to avoid disturbing influences upon the woman with child.

Should the dentist, who ought to be a physiologist, be less regardful of safe rules than those who have been taught only by observation and the exercise of ordinary common sense?

It is hoped that these reflections may not be without value, especially to the younger members of the dental profession, whose attention may not have been called particularly to the subject.

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson, M.D.

Operations on Tonsil Glands. The case now before the class is one of hypertrophy of the amygdalæ. The patient, because of the very great enlargement of the glands, and because he is subject to inflammatory attacks of the organs, not unfrequently finds himself in danger of suffocation. The object in his coming to our clinic is to seek a cure.

Can we afford him what he seeks?

Undoubtedly we can; and this with very little trouble to ourselves or pain to him.

The position of the amygdalæ between the half-arches, and the intimate relationship of these organs with what we may term the caliber of the swallow, make it necessary that we should inform ourselves pretty thoroughly concerning all pathological expressions associated with them. Asking your attention, I propose to consider with you the subject.

The anatomy.—A tonsil gland is an analogue to the lymphatic gland. The ordinary size of the body is that of a small nutmeg, which fruit it somewhat resembles in irregularity of surface. In constitution a tonsil is found made up of a congeries of lobules with intervening sulci, these sulci being lined with involutions of the common mucous membrane of the throat. The location of the gland is plainly seen by looking into the mouth; the palato-glossus muscle lying immediately in front, the palato-pharyngeal directly behind. Internally the gland is free, being covered alone by its mucous membrane; externally it is in relation with the internal carotid artery and with the muscles and fasciæ of the neck.

Diseases.—The diseases of the amygdalæ associate most prominently with scrofulosis, consequently the patients presenting in this direction will be seen almost invariably to be young persons; it is the exception where the age is above thirteen years. Hypertrophy is the most common of the tonsilar conditions met with in clinical practice; after this, subacute inflammation; after this, acute inflammation. Other conditions are abscess, cystic tumors, malignant scirrhus, epithelioma, encephaloma, chancroid sores, aphthæ, etc.

Hypertrophy, or chronic enlargement, as the condition is termed by many writers, is an undue growth of the organ, the result commonly of the scrofulous diathesis, but which not unfrequently arises out of oft-repeated inflammatory attacks associated with the conditions of croup, scarlet fever, diphtheria, etc.

The ill results of tonsilar hypertrophy are manifold, the most important being danger to life from acute inflammatory accessions. Interference with nasal respiration is another of the evils, the obstruction engendering a habit of mouth-breathing, which in the scrofulous is not without danger, as the health of the lungs is concerned. Deafness is still another of the complications; interference in many cases with the office of the Eustachian tube being very marked. Still another evil is a drawling manner of speech, the words leaving the mouth with a smothered sound. Snoring during sleep is yet another of the associations; while, when the bodies on either side are much increased in volume, considerable difficulty may be experienced in the ordinary act of deglutition.

Tonsilotomy, or partial ablation of the gland, is an immediate and potent remedy. When amputation of this gland was first proposed grave discussions arose among surgeons as to danger from hemorrhage. Even Physick, certainly one of the most skillful of American operators, contented himself for a long time with the use of strangulating ligatures, being indeed driven from their use only by a succession of accidents met with by him in the way of inflammatory trouble provoked by the practice.

The risk to be run in the way of hemorrhage in this operation is so trifling as scarcely to call for a moment's hesitation. In hypertrophy of this gland, so much contracted are the vessels found as a result of enveloping exudates that when cut they bleed very little. The operation of ablation has been performed a great many times by your lecturer, and he has yet to meet with his first case of serious trouble. Indeed, to control hemorrhage from an excised gland seldom requires other assistance than that of a gargle of cold water, or, if this fail, an addition to the fluid of a little alum.

A method employed by a few surgeons in the amputation of this gland consists in grasping the body with the claws of a tumor forceps, and, after pulling it away from its base, incising it with the curved bistoury. This plan is mentioned only to condemn it. No reasonably careful man would incur its necessary risks, and particularly would he not incur them seeing them to be unnecessary.

An instrument known as the tonsilotome is the means recommended to the class. The one here shown represents the various kinds,—that is, as the principle of construction is concerned. This one [instrument here shown] is known as the Physick tonsilotome. It consists, as is seen, of a fenestra to receive the gland, a sliding-pin to fix it when in proper relation, and a triangular blade for the ablation which follows the sliding-pin. In operating with this instrument the knife is pushed. The Fahnestock tonsilotome reverses the action of the blade, the cutting being done by a pull towards the operator. A tonsilotome designed by Mr. Kolbe, the surgical-instrument maker, unites with the means just referred to an automatic set of fingers; these fingers catch the gland and pull it under the blade. In skillful hands the Kolbe instrument seems perfection. It is liable, however, without care, to grasp and pull under the knife the uvula, thus making an undesirable double operation.*

To use a tonsilotome is to proceed as will now be exhibited. The patient being seated in this dental chair, we throw the head-rest somewhat back so as to get the light as fairly within the throat as possible. Designing to operate first upon the gland of the right side, I introduce the instrument, standing in this instance in front. At this point, just now, I am met by a difficulty not unfrequently encountered,—the fenestra will not go over the enlarged organ. To master this I lay the fenestra against the gland, and with the claw-forceps I catch the body, dragging it within the ring. Now I have it included to its base, or at least quite near enough to its base to insure against accident to the internal carotid artery. While now I hold it in this position the pin is slid forward. Now the relation of gland and instrument is fixed. The knife as it is pushed forward can cut nothing besides the gland, yet, as you see, the gland is amputated easily and perfectly. [At this moment the tonsilotome was withdrawn and shown to the class, having included in its fenestra the excised tonsil.]

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* Physick's tonsilotome is shown on page 523 of Garretson's System of Oral Surgery.

To remove the gland of the left side requires no change of position on the part of the operator; nothing is demanded but that the instrument be reversed. The ablation is accomplished precisely as has just been shown.

Ablation of the hypertrophied tonsil of cancerous signification is another matter entirely. Here there is to be thorough removal of the whole organ. To accomplish such removal, a plan proposed and practiced by Dr. Cheever, of Boston, may be pursued. The plan is as follows: Make two incisions, one commencing within the angle of the jaws and directed downwards along the border of the sterno-cleido-mastoid muscle; the second along the base of the jaw. In the dissection are exposed the digastric, stylo-hyoid, and stylo-glossus muscles. After these the superior pharyngeal constrictor, the fibers of which are to be separated. This dispartment exposes the gland. The operation is somewhat bloody, requiring the free employment of ligatures.

Another operation,—one which I have myself done, is practiced without external incision; it is dangerous, however, because of risk in wounding the internal carotid artery, and is only to be suggested to him who find himself at home in emergencies. I mean to say in plain English, that the man who attempts this manner of operation must have instruments and pluck enough on hand to cut down upon and tie the primitive carotid if such operation prove a necessity. The procedure consists in twisting the tonsil as far as possible out of its bed, and, after transfixing its base with a curved needle, slip behind it the well-tempered wire of an écraseur. To make the amputation with least risk of hemorrhage the crushing is to be carried forward with all slowness; the thing most contraindicated being haste. Reasonable hemorrhage, should it follow, may be controlled by the use of the ordinary styptics.

Acute tonsilitis is an expression of inflammation very common to young life, and one very frequently attended with fatal consequences. It is known as quinsy.

The trouble commences and runs its course in many cases with such extreme rapidity as admits of neither delay nor hesitation in its treatment. The dyspnœa associated with the disease is always a source of distress, and in a great multitude of cases has quickly resulted fatally.

The diagnosis of quinsy offers no difficulty. The glands stand out swollen and discolored; all neighboring parts are sympathetically irritable and sympathetically engorged; there is lacking no single phenomenal expression of inflammation; all are present,—redness, heat, pain, and swelling.

Scrofulous amygdalitis requires an anti-scrofulous treatment.

Diphtheritic tonsilitis demands specific treatment.

Diphtheritic pharyngitis—another name is pseudo-membranous inflammation of the pharynx—is a condition both of endemic and epidemic expression. It attacks in preference weakly children, but does not by any means confine its ravages to such. Children with tonsilitis are apt to be weakly children. The diphtheritic association is recognized in the dirty-looking cineritious exudates which appear on the gland or about neighboring parts. Sometimes this exudate is reasonably white, sometimes it is yellow, sometimes it resembles old flour-paste more than anything else. The tonsil itself is tumid, of a very dark red, and is markedly infiltrated with various fluids. Apart from blood-poisoning, great danger arises out of the extension of the exudate. It extends not unfrequently into the trachea and quickly smothers the patient. In a case lately treated by myself, the extension was in an upward direction; the nostrils were so plugged that twice during the progress of the disease I removed from them full and complete casts occupying the full length and breadth of the cavities.

Concretions.—Calculous concretions are occasionally causes of disease in the tonsils. In a case occurring in my own practice, a calculus developing in the deep part of the gland resulted in an abscess, which, when the patient came under my care, had been discharging for a period of four years through a tortuous sinus that opened just above the clavicle. To cure the case I had to amputate the whole tonsil. Fortunately, however, the history just given is not a common one. All that is commonly required to remove these bodies is a slight incision, while in a number of instances I have removed them from the mouth of a crypt at which they have presented, using only the plain finger-forceps.

Cystic tumors.—It is unfrequently, indeed, that simple cystic tumor is met with in the tonsil. The treatment demanded is the turning out of the contents and the smearing of the cyst-wall with a tincture of iodine or other alterative stimulant.

Gangrene.—Gangrene of the amygdalæ as a result of certain of the exanthematous affections may not impossibly demand your attention in the way of consultation with family physicians. Excluding a resemblance sometimes met with in diphtheria, no difficulty is found in the way of diagnosis. In gangrene of the tonsils there is a peculiarity of odor not to be mistaken, the gland itself is livid, much difficulty is commonly experienced in attempts at swallowing, there is considerable pain, and generally inflammatory fever. The treatment is the same as that for diphtheria.

Indolent tonsils.—While on the subject, I show to the class a form of atomizer used by me very freely in private practice for the stimulation of sluggish tonsils and indolent mucous membrane. The instrument, as you see, is very simple, consisting of a bottle to hold the fluid, a rubber bulb, and an atomizing tube. A good stimulant to use is tincture of capsicum much diluted,—a teaspoonful of the tincture to a goblet of water. Tincture of iodine is another most excellent remedy,—a teaspoonful of the officinal preparation to an ounce of alcohol. Still another is the aromatic sulphuric acid,—acid and water equal parts. If a throat be delicate and the patient sensitive, cologne water may be employed.

Stimulation being recognized as the indication, the means used is to be derived from a large selection. The instrument uses alike, of course, any fluid.

PROCEEDINGS OF DENTAL SOCIETIES.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY THEODORE F. CHUPEIN, D.D.S.

At the annual meeting of this body, held October 8th, 1878, the following gentlemen were elected to serve for the ensuing year:

President.—Robert Huey.
Vice-President.—J. H. Githens.
Recording Secretary and Reporter.—T. F. Chupein.
Corresponding Secretary and Librarian.—W. H. Trueman.
Treasurer.—J. W. Adams.

On the adjournment of the annual meeting the stated monthly meeting was convened, when the subject of the "New Departure" was presented for discussion.

Dr. W. H. Trueman being called upon to open the discussion, said that in the experiments he had made with a view of testing the practical value of the theory on which the so-called "New Departure" is based, he had endeavored to ascertain what would be the probable effect of the electro-chemical action between the filling and the tooth, provided such action existed. So far he had failed to find any difference in the effect produced by destructive agents on the teeth, due to the presence of the filling or the material of which it was made. He had noted the electro-chemical effect produced by the contact of metals, but failed to find any like effect when metals and dentos were connected under similar conditions. He exhibited a number of teeth which had been subjected to various experiments. He had experimented with gutta-percha and amalgam, with a view of ascertaining if, as stated, they made "leaky fillings." He found no difficulty in making with either material fillings that resisted the aniline perfectly, provided the substance in which they were placed was not penetrated by it. Wherever the fillings were in contact with *enamel* they were clean, but *bone*, *dentine*, and *cementum* failed to resist it.

Dr. Kingsbury felt obliged to Dr. Trueman for the very exhaustive experiments he had instituted with a view of testing the truth of this so-called new theory, which is at present claiming the attention of the profession. He asked if in the experiments made any regard to temperature was had. The natural temperature of the oral cavity was about 100° F. This should be one of the conditions in such experiments.

Dr. Trueman replied that no attention was paid to the temperature. They were undertaken simply to ascertain if the presence of gold had a similar effect on a human tooth immersed in acid that the presence of copper had upon zinc under similar conditions. He did not consider them at all conclusive. From the fact that Dr. Flagg, after what is represented to have been a carefully conducted series of experiments, conducted under unusually favorable conditions, had failed to find any electric current between gold and dentos, and his own experiments having failed to show any effect due to the presence of the filling, and his observations in the mouth being equally conclusive in the same direction, he felt convinced that no such action existed, and therefore felt no encouragement to push the experiments any farther. Do the best we can, he believed it impossible to obtain the same conditions out of the mouth that we have in it. The destructive agents we experiment with out of the mouth usually affect the enamel most, while these in the mouth usually affect it least. Laboratory experiments may be suggestive, but cannot be conclusive in a case like this.

Dr. Kingsbury felt that the results of the experiments should not be taken as an infallible guide in determining the nature and cause of dental caries, inasmuch as the conditions and agents in the experiments did not correspond to those in the oral cavity. In the specimens he held in his hand he observed that an attempt had been made to cap a nerve with gutta-percha. He had been very successful with this agent for this purpose, but the specimens indicated failure. Dr. Flagg cites several cases to prove the value of plastic fillings in his practice. As an offset to these, thousands of cases could be produced, where teeth filled with gold have been most effectually saved, the teeth looking beautiful, and the fillings being intact after a period of more than twenty-five years.

Dr. Trueman said the specimens alluded to were the first inferior molars of a miss, aged about eight years, when the teeth were first examined. From the condition of the teeth and the mouth it was decided to extract them when they could be spared. The cavities (crown cavities) were large, but the pulps were not exposed. They were filled with Hill's stopping. After an interval of twelve months as to one tooth, and of eighteen months as to the other, a portion of the gutta-percha was removed and amalgam inserted. The gutta-percha at the bottom of the cavity was not disturbed. When extracted, the amalgam had been in the tooth first filled about two years, and about one year in the other. The pulps were both dead, and the gutta-percha thoroughly decomposed. He had attempted capping in protecting pulps in over thirty recorded cases; nearly all had returned inside of two years with the pulps dead,—a result he could not account for.

Dr. F. M. Dixon sustained Dr. Trueman with regard to gutta-percha as a nerve-capping. He had had a young man with him (since deceased) whose manipulation of this material, and whose delicacy of touch about an exposed nerve, or one nearly exposed, were something wonderful, as he, as well as some of the gentlemen present, could bear testimony; yet with all this excessive care, this velvet-like touch, the nerve-cappings made, both by himself and the person alluded to, had all failed, while oxychloride of zinc had been successful.

Prof. Peirce said, in reference to the remarks of Dr. Dixon respecting the death of the pulp under a capping of gutta-percha, that however slightly the pulp is exposed and wounded, there is as a result of this injury an exudation of plasma or serum, which, if confined in contact with the living tissue, soon becomes a source of irritation, from its decomposition or degeneration into pus and gas. This in its expansion presses back upon the vascular tissue, in proportion as the capping over it is complete, preventing its exit through the cavity of decay or crown of the tooth. So with the exercise of the greatest care and most delicate manipulative ability the results must be disastrous to the health of the pulp. Whereas, in the use of chloride of zinc we have not only an escharotic and an antiseptic, giving the exposed surface of the pulp the advantage of these important properties, but we have also a material which will effectually prevent a thermal shock, from its non-conducting qualities. In referring to the subject more properly under consideration, "the relative value of materials for filling teeth as indicated by the cause of caries,"—the "New Departure,"—he reviewed the different theories which have been advanced by the profession from time to time of the exciting cause of caries,—the chemical, vital, chemico-vital, parasitic, and finally the electric. He thought the varieties of tooth-structure and of systemic conditions render the adoption of any positive views respecting either the cause or treatment of caries very difficult. Our education has been too limited, and our statistics are too incomplete, for a satisfactory classification or arrangement. The pathological process, which results in the greater or less destruction of tooth-tissue, and which is recognized under the name of dental caries, belongs largely to civilized life, its growing increase and now almost universal prevalence being a concomitant of modern civilization. It is a question well worth considering whether many of the various conditions now recognized as being present during the progress of dental caries, and supposed to facilitate its advance, be not like the disease itself, the results of a life condition, and occurring simultaneously as an effect of the same cause. We take, for instance, what is recognized as the parasitic cause of caries. Some believe this disease due to a putrefaction caused by minute infusorial animalcules which live in the mouth, and to which they have given the name of "Denticola." Others think it due to putrefaction caused by a rapid proliferation of a vegetable parasite called "Protoccus dentalis," or to another parasite which burrows into the tissue of the teeth, known as "Leptothrix buccalis." Earnest, honest, and apparently accurate descriptions have been given of the histologic changes of the enamel and dentine as the destruction of these tissues gradually progressed under the supposed influence of these parasites. The authors and advocates of the parasitic theories seem to have overlooked the fact that it has been, and indeed still is, an open question whether these microscopic beings, vegetable or animal, are more than mere followers of decay, "messmates" lying always in wait to consume the tissue of animals and plants,—following devitalization and disorganization, never preceding. Electrolysis, the still more modern theory, and upon which is based the "New Departure," is not less enthusiastically presented by its advocates, but it may yet be found to be the result of other than local conditions. This subtle enemy, which some of our friends have so satisfactorily to themselves demonstrated to be the destroying agent, is supposed to be the result of an abnormal condition of the teeth. To use the language of Mr. R. Bridgman, "The pulp-vessels should be charged with negative electricity, the normal pulp with positive electricity, but in a pathological state the surface of the dentine as well as the roots would be charged with negative electricity." Now of the existence of these positive and negative conditions, and of the currents resulting therefrom, we know but little, nor have we as yet, to my knowledge, any method of accurately measuring or testing its presence or quality. It is assumed with a degree of authority that all chemical action involves electric disturbance, and also that acid fluids act chemically on all tissues in which the salts of lime largely preponderate, as in tooth-structure. It is also asserted, and with so much earnestness and decision that it is fair to assume that this is the corner-stone of the "New Departure," that this electro-chemical action is greatly facilitated by the presence of a gold filling in the tooth; that its disturbing influence is due largely to its capability of conducting thermal changes to the surrounding tissue, and also that fillings of other materials are more and more in harmony with the normal electric condition of the tooth in proportion as they possess a poorer conducting power. Now, of the theories which have been advanced, it is a natural query whether this one of electrolysis is any more than the others capable of satisfactorily explaining conditions which time and again seem to baffle all our best efforts in tooth-saving. To assert dogmatically that gold is the best material with which to save all teeth would be a statement which, in my estimation, would be very wide of the truth. Conversely, to assert that it is the poorest material with which to fill any teeth would be certainly still further from the truth. That gold has been effectually used, and can be and is so used in full two-thirds of all the teeth which need filling, is certainly a statement in correspondence with the judgment of the majority of educated dentists. That the remaining third can be as well saved, and probably better, with some other material than gold will, I think, be allowed by the majority of our practitioners. But I am not prepared to state why gutta-percha, oxychloride of zinc, amalgam, or tin, in some form, has a more benign influence upon a certain kind of tooth-structure than gold does, other than the fact of their increased adaptability and decreased conductibility. The fact that thousands of gold fillings can be found in teeth where they have been doing good service of twenty years and upward is pretty conclusive evidence that these teeth at least have not had their electrical condition disturbed sufficiently to produce any destruction of tooth-tissue.

Prof. Buckingham had no faith in the theory of the "New Departure." All the experiments made to establish that theory had been made out of the mouth and on dead matter. How ridiculous would it be in a physician to inject a dead body and expect to observe any of the results which would be produced on a living one! Vital energy is either able or unable to resist external influences. For instance, if pure sulphuric acid be put on any part of the body, its power being greater than the vital energy, the living body succumbs to its action; but if the acid be diluted, then the vital energy being greater, overcomes its action, and the acid is harmless. The experiments instituted to establish this new theory were all tried on dead tissues, where vital energy could have no counteracting effect. The question is narrowed down to whether gold is the best or the worst material with which to fill teeth. For his part he was quite satisfied with its attributes in this regard. He had no reason to change his good opinion of its qualities as a filling material.

Dr. Kingsbury said he had no faith in the theory of the "New Departure." Its condemnation of gold as a filling material is founded in error. He had used gold to fill teeth since he was eighteen years of age, and his faith in its ability to save them when it is properly manipulated is still unshaken. He had no doubt that the theory of the so-called "New Departure" operators would soon be exploded, and he hoped they would be reclaimed and return to the better system of practice, to substantiate and sustain the "Accepted Creed."

Dr. Daniel Neall spoke of his long practice of dentistry, as well as of his extensive use of gold for filling teeth. At one time, when the attributes of this or that filling material were vaunted, to the detriment of gold, he had an idea that possibly he had lived in vain; but his steady and unwavering faith in gold "purified by fire" had only tended to confirm (if confirmation were necessary) his confidence in this sheet-anchor of dentistry. He once used only gold, but noting the adaptability of amalgam and other plastics in certain classes of decay, and in certain characters of teeth, was induced long ago to try them, and he had not regretted his experience.

Dr. Githens said that he had heard Dr. Townsend say over and over that whenever he could get the chance of removing the amalgam fillings he had inserted he invariably did it; for though his faith in it had been strong, he had lived to regret the use he had made of it. He (Dr. Githens) did use it in teeth difficult of access, as well as in such teeth as he thought would be lost in a few years if left unfilled.

Prof. McQuillen said he had always regarded it a duty as a teacher to caution students against being led by extremists either in theory or practice. He spoke of the evidences we have had in Philadelphia of the utility of gold as a filling material in the operations of Hudson, Townsend, Daniel Neall, and others, which have stood the test of twenty-five, forty, and, in some instances, even fifty years. It would be a waste of time to defend a substance that speaks trumpet-toned for itself. On the other hand, plastic materials are of inestimable value when used in their proper place. The extremists who have advocated gold as the only substance that should be used as a filling material are, to a certain degree, accountable for the action of the extremists who advocate and use plastic materials indiscriminately. But human activity and progress are stimulated by the antagonisms of extremists; the solid and enduring work is accomplished by eclectics who take and use that which is good from both sides.

Adjourned.

NEW JERSEY DENTAL EXAMINING BOARD.

The Board of Examiners of the New Jersey State Dental Society will convene at No. 27 Fulton St., Newark, January 10th, 1879, at ten A.M. All persons practicing dentistry contrary to the laws of the State, or any one about commencing the practice of dentistry, will be in attendance for examination. Further information can be had of the Secretary, C. S. Stockton, 15 Cedar St., Newark.

CENTRAL PENNSYLVANIA DENTAL ASSOCIATION.

The semi-annual meeting of the Central Pennsylvania Dental Association will be held in Huntingdon, January 15th and 16th, 1879.

OFFICERS.

President.—W. B. Miller, Altoona.
Vice-President.—E. C. Blackburn, Philipsburg.
Recording Secretary.—J. C. M. Hamilton, Tyrone.
Corresponding Secretary.—G. L. Robb, Huntingdon.
Treasurer.—J. S. McKiernan, Clearfield.

J. C. M. Hamilton, *Secretary.*

BIBLIOGRAPHICAL.

Mechanical Dentistry. A Practical Treatise on the Construction of the Various Kinds of Artificial Dentures, comprising also useful formulæ, tables, and receipts for gold plate, clasps, solders, etc. By Charles Hunter, Mechanical Dentist. Philadelphia: Lindsay & Blakiston, 1878.

The author of this volume—an English dentist—announces in the preface that it has been his design to make it a "specially *practical* one." From that stand-point, our first criticism is that throughout the volume more attention is given to special rules for extreme and exceptional cases than to the inculcation of general principles. A text-book should first of all aim to instruct in the best method of dealing with the average case and the principles involved. These fairly comprehended, the exceptional cases will not be difficult of mastery. Purposely, doubtless, the preparation of the mouth for the reception of an artificial denture is not discussed. Nothing is taught in reference to the desirability or admissibility of the removal of roots or teeth, or as to the advantages or disadvantages of their loss or retention.

The first chapter treats of impressions and plaster models (casts). The various materials used in taking impressions of the mouth are described, but no directions are given as to the conditions which should guide in the selection of one in preference to another. The method of detaching an adhering plaster impression by force would be generally if not always unnecessary if the patient were directed to cough, and thus lift the soft palate. The complicated methods given for taking an impression in plaster where there are irregularly-placed teeth remaining are far inferior to the plan of allowing the plaster to set, breaking the impression, and restoring the pieces into position after removal from the mouth. Waxing a model (cast) previous to moulding is not so good as varnishing it.

The second chapter is entitled "Casting Metal Models" (dies). The best molding sand (marble dust) is not mentioned; the illustrations of difficult cases are exaggerated, and the directions for overcoming the difficulties unnecessary, as in most partial cases it is quite practicable to mold with the teeth on the cast; withdraw the zinc die from the sand immediately after it hardens, and while still hot cut off the teeth with cutting nippers. The fact that the shrinkage of zinc interferes more or less with the perfect fitting of plates is mentioned, and it is stated that some have tried to overcome this difficulty by the use of so-called fusible metals; against which, however, there are "objections of another kind." What these objections are we are not informed. Certainly for finishing dies fusible metals are esteemed very valuable by many.

In chapter third, under the caption, "Gold, Plate, Clasps, Wire," the alloying of gold is spoken of as "*mixing* with it a certain amount of silver and copper." Sixteen-carat gold is mentioned as that which is favored by the majority of dentists for clasps and wire. In this country it is not deemed wise to use wire in the mouth baser than eighteen carat, while for clasps the strong and elastic alloy of gold and platinum is alone thought suitable.

The operations of melting and alloying gold, of casting into ingots, of rolling into plate and drawing into wire, are described, occupying pages that might better have been devoted to more practical matters in these days, when certainly very few dentists, at least in America, prepare their own plate and wire. The alloy for gold plate is said to be "always silver and copper." We think the alloy of silver alone has been generally adopted in the United States.

In chapter four, which treats of "The Blow-pipe and Soldering," the foot-bellows-, the hydrostatic-, and the mouth blow-pipe are described, but no mention is made of the more effective, durable, and convenient instruments which have almost entirely superseded them. The author says that borax, when used in excess on gold in soldering, "acts as a most effectual *barrier* to the running of the solder over the parts where it is desired." We have always found it to be anything else than a barrier to the flow of solder. It is directed that the case be heated up gradually after the borax is applied, as otherwise the "borax will swell and displace the solder," but no caution is given as to the care necessary in heating and cooling to avoid cracking the porcelain teeth.

In chapter five, devoted to the "Swaging or Striking up of Plates —Casts," a "sharp blow" is directed to be given the die when the swaging process is commenced,—a proceeding very well calculated to tear the plate. Instead of using a fusible metal die to overcome the trouble caused by contraction of the zinc, the author recommends springing the plate with the fingers or pliers. Directions are given for constructing "suction-chambers," but their advantages and disadvantages are not discussed, nor is there a line to indicate in what portion of the plate they should be placed,—a most important consideration. The directions for making cavity-chambers do not represent either the best or the easiest method. "Partial cases," it is said, "are generally supported in the mouth by means of clasps." The conditions which render clasps necessary are not discussed. The age of the patient, the condition of the remaining teeth, and the teeth to which it is most desirable to attach clasps, are topics not even hinted at. In the United States it is customary to support most partial plates by atmospheric pressure instead of clasps. Under the caption, "Arrangement and Disposition of Clasps," some very good and clear directions are given. The question is asked, "How shall a plate carrying bicuspids and molars be fastened, where only the front six natural teeth are standing, with no space between laterals and canines?" We should say, without hesitation, by atmospheric pressure, but our author says, "The clasp in such a case must be fitted completely round the *face* of the canines, in the shape of a narrow band near the gum."

The articulating impression is termed (chapter six), "Taking the 'Bite' in Wax and Plaster." This chapter is illustrated by some very primitive articulators.

Chapter seven is devoted to "Setting of Mineral Teeth on Gold Plates." No directions are given to guide the learner as to the proper selection of teeth, but the mechanical manipulations are minutely and generally intelligently described.

Chapter eight treats of "Vulcanite Work," but its merits and demerits as a base are not discussed, nor is its special applicability in a certain class of cases indicated.

Chapter twelve—"Continuous-Gum Work"—is derived mainly from earlier American writers. The latest and most improved methods of constructing this variety of dentures are not described. In this connection the Fletcher gas furnace is illustrated, and alluded to as though it could be used in fusing the material, while in fact it is utterly valueless for this purpose.

Want of space forbids comment on the other chapters, of which there are nineteen in all. The topics discussed besides those alluded to are "Combination Work," "Pivoting Teeth, "Repairing," "Celluloid," "Obturators and Artificial Palates," "Vulcanite," "Metals used in Dentistry," "Properties of Metals, Specific Gravity, etc.," "Electro-Gilding," and "Miscellanea."

There should have been room in such a volume for a chapter on the æsthetics of dental prosthetics; room for instruction as to the various styles of teeth and bases, their applicability under different circumstances, etc., and some of the chapters the captions of which are given might without disadvantage have been omitted entirely, if necessary, to make room for a discussion of more important matters, such as the construction of partial lower sets, and the use of plain and gum-plate teeth in connection with vulcanite, etc.

To all this it may be said that it is easier to criticise than to create, —a truism. Nevertheless, if it were not for criticism second editions would not be likely to be improvements over the first, and therein lies the justification of the critic's vocation.

OBITUARY.

GEORGE F. BOOTH, D.D.S.

DIED, in Concord, N. H., November 3d, 1878, after a short illness, of typhoid fever, Dr. GEORGE F. BOOTH, aged twenty-eight.

He commenced the study of dentistry with Drs. Cummings and Young in 1865, and continued with them until January last, when he bought out the office of the late Dr. J. W. Little, where he was doing a successful business. He graduated from the Boston Dental College in the class of 1877. By hard work and study he had acquired an education and established himself in his chosen profession. He was a gentleman of unblemished character, genial in his nature, and possessed a large circle of friends. He was treasurer of the New Hampshire Dental Society. He leaves a widow and one child.

E. O. KINSMAN, D.D.S.,
Secretary Class of 1877, *Boston Dental College.*

PUBLISHER'S NOTICE.

THE NEW VOLUME—THE TWENTY-FIRST.

THIS, the initial number of the volume which will bring the DENTAL COSMOS to its MAJORITY, is sent to a larger number of subscribers than any other dental journal in the world has ever secured, its *bona fide* subscription list being, we think, at least double that of all the other dental journals combined.

It is believed that not only the size of the journal's subscription list, but as well its wide distribution, is without parallel in dental journalism. During the year just closed it has been mailed to subscribers in all the States and Territories of the Union, in Canada and the British provinces, in Cuba, Jamaica, Porto Rico, and other West Indian islands; in Mexico and Central America; in the South American states; in England, Scotland, and throughout the United Kingdom; in France, Germany, Russia, Italy, Spain, Switzerland, Norway, Holland, and other European states; in Australia, New Zealand, Japan, and China; in the Sandwich Islands, and the Azores; in a word, wherever English-speaking practitioners of dentistry are found.

As to our future circulation, the indications point unmistakably to a still further increase. We confidently anticipate an aggregate issue during the year of more than 80,000 copies.

As to the character of the volume for 1879, we shall do all that lies in our power to make it as valuable to the dental practitioner as our facilities—certainly large—will allow.

Dr. J. W. White will continue in the editorship. We ask for prompt subscriptions and renewals.

SAMUEL S. WHITE.

PERISCOPE.

The Physiology of the Salivary Secretion.—The precise mode in which secretion is effected is still, notwithstanding all the attention that has been bestowed upon it, shrouded in considerable mystery. In the case of the kidney, various evidence tends to show that the watery part is eliminated at one part and the salts at another, but scarcely any positive facts of this nature are known in regard to other secretions. An able article has, however, just been published by Heidenhain in the last of *Pfluger's Archiv*, which seems to throw some light on the point in question. The proposition Professor Heidenhain endeavors to establish is that the secretion of water and salts on the one hand, and of organic material on the other, are not in direct causal connection with each other, but are separate acts under the control of two different sets of nerves, the secretory and the trophic, which, however, for the most part, run in the same nerve-trunks. The facts on which he relies to prove this are, that whilst the activity with which saliva in the case of the submaxillary gland is secreted augments with the degree of stimulation applied to the nerves, provided these are not exhausted, the percentage of salts increases likewise to a certain maximum, quite independently of the previous condition of the gland. On the other hand, the percentage of organic matter it contains, though also augmented with the degree of stimulation applied to the nerves, does not bear a constant ratio to this, but is strongly influenced by the previous condition of the gland, and especially by the intensity and duration of the previous excitation. If the gland be continuously excited for some time, it will be found that though the quantity of the saliva—*i.e.*, the quantity of water—remains the same, as well as the amount of salts it contains, the proportion of organic matters gradually decreases, because apparently the amount of pabulum in the gland is used up. That variations in the elimination of the watery and saline parts of the saliva on the one side, and of the organic matters on the other, do not run a parallel course, is further shown by several experiments. In the first place, taking a fresh and unexhausted gland, if the strength of the stimulus be gradually increased, the flow of saliva augments, and with it the proportion of both organic and of saline constituents, but the former in larger proportion. But if to a gland already exhausted a still stronger stimulus be applied, although it appears to respond to the lash, it does so only so far as the watery and saline constituents are concerned, the organic material either actually diminishing, as occurs with a moderate increase in the strength of the current, or requiring a very strong current to produce a very slight increase, and even this, if the gland be much exhausted, may altogether fail. Lastly, if in a fresh gland the stimulus be gradually increased, and then again diminished, in intensity, the quantity of the saliva as well as of the saline and organic constituents will be found to rise and fall, but not in equal proportion, the watery and saline parts diminishing to a greater extent than the organic, the difference being better marked the more intense the temporary increase of stimulation is, from whence Heidenhain concludes that a very strong stimulus leaves a secondary or after-condition which renders the gland more disposed to eliminate organic matter. It would thus appear that there is an intimate connection between the water and the salts of the saliva, the proportion of these rising and falling together in accordance with variations in the strength of the stimulus; whilst the amount of the organic constituents, though broadly agreeing with these in its variations, yet follows laws of its own; and it is this difference which leads him to think that the elimination of the watery and saline constituents is under the control of one set of nerve-fibers, the secretory, whilst the organic substances are subject to the influence of another set, the trophic nerves.

Professor Heidenhain next proceeded to investigate the relations of the parotid gland, which, as he remarks, there is no ground for assuming should necessarily present the same behavior as the submaxillary to the nervous system. He corroborates Loebs' statement that the motor nerve of the gland runs in the nervus petrosus superficialis minor, and points out that the parotidean saliva is not always so watery as is generally supposed, that it is liable to remarkable variations in regard to the amount of organic and inorganic constituents, and that, under different conditions, the quantity of the latter held in solution is double, and of the former twenty-five times, the ordinary amount. In regard to the influence of stimulation of its nerves, the effects are in all respects similar to those already described in speaking of the submaxillary gland. He found, moreover, that the sympathetic nerve possessed a powerful influence over it; since if this was stimulated shortly before, or coincidently with, Jacobson's nerve, there was an immediate increase in the quantity of organic substances eliminated by the gland, though there was no increase in the absolute quantity of fluid discharged. The sympathetic contains the vaso-constrictor fibers of the gland, and it might be supposed that the change in the secretion was due to changes in blood-supply, but a very curious fact came out from his further experiments,—namely, that ligature of the carotids, though somewhat diminishing the absolute amount of saliva eliminated, had no influence on the solids it contains, either in the case of the parotid or of the submaxillary gland, which shows well the complete independence of secretion on blood-pressure.

Heidenhain next undertook to examine the parotidean saliva of the rabbit, in relation, on the one hand, to the chorda tympani, which was shown by Rahn to contain secretory branches for this gland, exciting the flow of what may be called cerebral saliva; and on the other to the cervical sympathetic, which V. Wittich and Nawrocki have shown to lead to the secretion of so-called sympathetic saliva. The parotid of the rabbit is well adapted for experiments of this nature, since it contains a diastatic ferment that is absent in the secretion of this gland in the carnivora. He found that small quantities of pilocarpin injected subcutaneously produced the same effect as stimulation of the chorda tympani—gave, in fact, an abundant flow of cerebral saliva, probably by acting on the same mechanism in the gland. The cerebral or pilocarpin saliva contained only 1.02 to 2.05 per cent. of solids, whilst the sympathetic saliva contained no less than from 3.72 to 6.65 per cent., the greater part consisting of organic matter. The secretory fibers of this gland therefore run in the glosso-pharyngeal and chorda tympani nerves, whilst the trophic are contained in the sympathetic of the rabbit. The histological changes in glands that occur with variations in the activity of secretion seem to differ to a very remarkable extent. We have no space for the details of the experiments he gives.

Professor Heidenhain advances the following view as the most satisfactory explanation of the facts he has observed. We must presuppose, he says, the presence of some substance in the cells having a strong affinity for water, and it is not unreasonable to assume that the protoplasm constitutes this substance. Water is first abstracted from the lymphatic spaces, and then secondarily from the interior of the blood-capillaries; and imbibition takes place into the protoplasm till a state of equipoise is attained, no change occurring as long as the gland is at rest, though the tension of the water in the protoplasm is considerable. The effect of excitation of the secretory nerves is to induce a change of the molecular arrangement in the limiting layer of the protoplasm on that side of the cell which is turned towards the lumen of the acinus, in consequence of which diminished resistance to the act of filtration occurs at this part. Water consequently escapes, the outflow being perhaps maintained or increased by contraction of the protoplasm, as Kühne has actually observed in the cells of the pancreas of the rabbit under the microscope. The tension of the water in the cells falls below the imbibition-power of the protoplasm, and a current sets in from the blood-capillaries, and the escape of water from the inner surface and the absorption through the outer surface of each cell continue as long as the protoplasm contracts under nerve-influence. When the excitation ceases the protoplasm returns to its former condition, the current stops, and the gland returns to a state of rest. This view, it will be observed, does not make the excretion of water in any way dependent on the blood-pressure, whilst it explains why no more water leaves the capillaries than is required to make up what is withdrawn from the lymph-spaces, why, however long the excitation is applied, the lymph-spaces never become charged with excess of fluid, and why the excitation is neither accompanied nor followed by any increase of lymph in the efferent lymphatics.

The functions of the trophic nerves, he thinks, is to lead to the formation of soluble organic substances in the gland-cells, which are dissolved by the fluids eliminated under the influence of the secretory nerves. The organic constituents are not formed directly from the protoplasm, but during the period of rest substances are formed which stand in close relation to the specific constituents of the gland. Thus, in the case of the pancreas, during rest, the zymogen of the trypsin is formed, from which the trypsin is afterwards developed; and thus in the mucus-glands, not the easily-soluble mucin itself, but a substance that is easily convertible into mucin, is formed. It would otherwise be unintelligible why mucin does not appear in moderate quantity on slight irritation of the chorda, when the aqueous portion of the secretion is slowly percolating the cells. We thus obtain an explanation of the reason why the cells of quiescent mucous and serous glands are relatively poor in protoplasm, presenting a clear and but slightly granular aspect, whilst they are rich in the mother-substances of the proper products of the secretion. And hence, too, we learn why, after persistent activity, the glands are rich in protoplasm, as indicated by their marked cloudiness and granular aspect, whilst they contain but little of the material proper for the production of the organic constituents of the gland. In what mode the trophic nerves effect the conversion or aid in the elimination of the organic substances of the gland Professor Heidenhain does not attempt to explain.—*Editorial in London Lancet.*

THE PATHOLOGICAL ANATOMY OF SCURVY.—Scurvy has happily become so much less common a disease than formerly, that the opportunities for applying modern methods of research to its pathological anatomy are comparatively rare. Such opportunities have, however, been numerous at Cronstadt, and Dr. N. Uskow, the superintendent of the Marine Hospital there, has made good use of the material, and has published some of his results. He concludes that scurvy is a general disease with a series of characteristic anatomical changes which are not located in any one organ, but are disseminated through the whole vascular system. The most constant change is the affection of the gums, and upon this the chief part of the microscopical observations have been made. The affection of the gums begins in the deeper layers, and consists in the development of obstruction in the blood-vessels, and one of the consequences of this obstruction is the stasis of the papillæ, the vessels of which are so often distended that of the proper structures of the papillæ only the epithelium may be visible. The appearances in the deeper layers of the epithelium are, first, more or less swelling of the endothelium of the vessels. The lumen of the vessel is commonly increased, and is plugged, sometimes with red corpuscles, sometimes with white corpuscles, rarely with both. Where the white blood-corpuscles are accumulated, the swelling of the endothelium is greatest; where the red corpuscles are accumulated, the endothelium is almost normal, but is often detached from the wall of the vessel, and lies among the red corpuscles. Later on there occurs an extravasation of red blood-corpuscles, which become transformed into brown, translucent, granular pigment. Rupture of vessels could never be seen. The swelling of the endothelium at the spots at which the white blood-corpuscles are accumulated is often very great, and it is scarcely to be distinguished from the white corpuscles. Proliferation of the endothelium could not be seen, but at a later stage there are dense, firm bundles of connective tissue, between which larger or smaller nests of round granulation-cells are imbedded. The substance of the connective-tissue bundles is not altered, but in the interstices is a light-brown, finely-granular pigment. The granulation-tissue nowhere shows any trace of fatty degeneration. When the disease is intense the papillæ of the gum become gangrenous and break down, and when the destruction extends further the granulation-tissue is also affected. The morbid process may involve the deep layers of the periosteum, between which and the bone are found some traces of extravasation and caries. A similar vascular change may be seen, although rarely, in the periosteum of the anterior extremity of the ribs. When the affection is very intense the anterior extremity of the rib-bones may be attacked with osteitis rarefaciens, as Slavianski has pointed out, and this may proceed to complete destruction of the compact tissue of the bone, so that the spongy tissue passes without demarkation into the periosteum, and the latter may assume the appearance of marrow. Later, the connection of the ribs and their cartilages may be altered and disturbed. The marrow of the ribs, as well as of the other long bones, is red, and on microscopic examination is found to consist of red cells and a few fat-cells and pigment. Thus it appears that in scurvy there is a series of acute changes in the vascular system. Whether the changes in the vessels depend on a change in the blood is difficult to say, but it is noticeable that the number of blood-corpuscles is not abnormal (red, 3,500,000 to 4,700,000; white, 20,000 to 47,000 per cubic millimetre). Inflammatory appearances are often accompanied by fever, for on simple affection of external parts (without pleurisy or pericarditis) the temperature is from 36° to 38° Cent., and the morning remission from 1° to 1½° Cent.—*The Lancet.*

FUNGUS OF THRUSH.—Dr. Paul Grawitz, in a contribution to the systematic botany of vegetable parasites (*Virchow's Archiv*, August, 1877), points out that in thrush-patches, besides epithelial cells, various forms of bacteria, torula cells, and myelin of pleospora, oidium lactis, and mucor mucedo, and others, there is always the proper thrush-fungus,—mycoderma vini (not the so-called oidium lactis). This specific fungus the author succeeded in isolating, and was able to cultivate in a modification of Pasteur's solution, as well as in plum-pulp. The appearance it assumed under cultivation depended on the amount of sugar present: when there was little sugar, it formed a widely-spreading mycelium; when a considerable quantity, it formed dense clusters of torula-like buds. When this fungus was administered in milk to healthy kittens and puppies no result followed, but when it was given to feeble, ill-nourished, and thus predisposed animals from three to eight days old, death followed in from four to ten days, and on examination the characteristic small white patches were found on the gums and fauces. Other fungi failed to produce the same results. Experiments with other fungi, achorion Schönleinii, trichophyton tonsurans, and microsporon furfur, led Dr. Grawitz to believe that they were all identical, and simply the familiar oidium lactis.

With Virchow, the author believes that occasional parasites, especially those found with lung-diseases in cases of diabetes, are of secondary importance.

When spores of fungi (pencillium, euroteum, mucor, oidium, and muscardine), suspended in distilled water, were injected into the carotid artery or one of the large veins, no results followed, except when bacteria were injected along with them, the bacteria setting up septic poisoning. The spores injected never germinated; they were either dissolved or eliminated by the kidneys. When introduced into the subcutaneous tissue they were either absorbed, encapsuled, or eliminated by suppuration. When the spores of oidium were introduced into the vitreous chamber, they germinated and formed small nodules composed of convoluted masses of mycelium threads. The vitreous humor seems to have been the only place which supplied all the conditions necessary for their growth. The influence of fungi on the system seems to be altogether of a mechanical nature.—*London Medical Record.*

ON A PECULIAR REACTION OF SALIVA.—L. Solera publishes the following note in the *Rendiconti del Reale Istituto Lombardo*, 1877, Serie 2, Tom. x. p. 371. Human saliva, whether filtered or not, whether fresh or kept for some time, possesses the power of reducing iodic acid. Saliva in presence of iodic acid becomes yellow, the color being due to the liberation of free iodine. This reaction depends upon the presence of potassium sulphocyanide which it contains; a weak dilute watery solution of potassium sulphocyanide gives exactly the same reaction with iodic acid as does saliva. This reaction is marvelously delicate, to such an extent that the author is able to detect so small a quantity as 0.0000004 gramme of the substance. None of the other salts which, according to the analyses of Frerichs, Jacubowitsch, and others, are present in the saliva, give this reaction, nor do the organic parts, viz., the mucus and ptyalin.—*London Medical Record.*

The Gums in Lead-Poisoning.—It will be remembered that a few years ago Dr. Hilton Fagge described, in an interesting paper, the microscopical characters of the lead line on the gums, and its dependence on the deposit of black pigment in and around the capillary loops. The same facts were described, almost at the same time, by M. Cras in the *Archives de Médecine Navale* (February, 1875, and May, 1876), and further observations by him were submitted recently to the Société de Chirurgie. He has examined the line in portions excised from the gums of many patients, and found that it was easy to demonstrate the presence of lead in all the capillaries by the action of chromic acid. This stains the whole gum of a yellow color, but the capillaries are distinctly marked by a much deeper tint, in consequence of the formation of chromate of lead. If now the section is washed in distilled water, and is treated with sulphide of sodium, the black tint of the capillaries is rapidly reproduced. Examination with high magnifying powers shows that the pigment is for the most part in the interior of the capillaries. M. Cras asserts that this line is not the only effect of lead upon the gums, and he describes another change antecedent to the lead line, and more constant, which he terms "saturnine gingivitis." The gums have two aspects,—the one free in the mouth, covered with epithelium, the other adherent to the teeth and periosteum. These two surfaces unite at the narrow festooned border, which the epithelium covers as far as the place at which the gum adheres to the neck of the tooth by its periosteal surface. The interdental processes, which fill up the furrow between the gums and the teeth, present two surfaces adherent to the teeth. The capillary circulation of the gum is constituted by two plexuses: the one superficial, papillary, with fine vessels; the other, deep and periosteal. It is always the periosteal plexus which is the seat of the deposit of lead; the papillary plexus is normal. He asserts that every lead line is accompanied by a detachment of the gum from the tooth. On separating the loosened edge of the gum by a needle, a drop of pus, retained between the gum and the tooth, often escapes. The excision of the edge of the gum for examination is easy and painless, the interdental processes being especially convenient for the purpose. It will be seen, if the periosteal aspect is removed, that there, in the section, the line is replaced by a dotted area due to the black infiltration of the capillary loops. Thus, the line which is visible on the outer aspect of the gums is only the edge of the layer of blackened capillaries on the periosteal surface. The mechanism of the production of the line is, according to M. Cras, as follows: First, by the chronic inflammation of the gum, the edge is separated, and in the space between the gum and the tooth organic matters accumulate. The sulphureted hydrogen disengaged during the decomposition of these organic substances passes, as soon as produced, into the walls of the capillaries, and, acting in them on the metal brought by the blood, a deposit of sulphide of lead takes place in the capillary network. The gingivitis and deposit extending around the tooth often lead to serious consequences,—retraction of the gum, abscess, etc. The production of this change is variable. The presence of tartar unquestionably assists its production. M. Magitot at the same meeting contested the opinion of M. Cras as to the seat of the deposit, asserting that it is placed invariably in the deeper layers of the epithelium of the gum, adjacent to the Malpighian layer of the mucous membrane, not in the capillary net-work; and urged that the deposit depends on the elimination of the lead by the saliva, and was precipitated by the effect of the sulphur in the tartar of the teeth.—*The Lancet.*

On Some Forms of Trismus arising from Dental Irritation.—Mr. Gaine read a paper on this subject. He prefaced his remarks by observing that some of these cases of trismus were very obscure in their origin, but the majority of them arose either from difficulty in erupting the wisdom-teeth, owing to an overcrowded condition of the teeth generally, or to periodontitis or necrosis. The majority of the cases that had come under his notice occurred in young women, and were associated with hysteria; and in the diagnosis it would be well to separate those which arose from dental irritation from those mixed up with hysteria. The former, if seen at an early stage, were much more readily dealt with than the latter, though at the same time the local symptoms might be much more severe. In those cases arising from dental irritation, when the jaws were closed, recourse must be had to some anæsthetic in order to forcibly separate them, when some lesion would generally be found connected with one or more teeth, which should be at once removed. A notched wedge, or Mr. Maunder's screw-gag, was of great service in these cases, and the patient should be instructed to constantly wear it, and move it backwards and forwards at frequent intervals, until mobility was established. In cases of long standing, Mr. Gaine found it the best practice to force a piece of tapered ivory between the molar teeth, and gradually work it on until the screw-gag could be inserted. The other class of cases—those connected with hysteria,—was frequently difficult to diagnose; the closure of the jaws occurred suddenly, and many of the symptoms of tetanus were present. Mr. Gaine then related several cases of trismus, associated with this hysterical condition, which had recently come under his notice, arising from tooth-irritation. In all the cases that he had seen, he did not know that he could point to one that came on suddenly that was not more or less associated with hysteria,—of course, alluding only to cases of trismus unconnected with tetanus. He believed it was generally an accepted fact, that spasm of some form or other affecting in nearly all cases the masseters and pterygoids by what is termed reflex action was the cause of the muscular rigidness which had to be contended with.

Nor was it only these muscles that were affected, but indirectly through the connections of the fifth nerve with the seventh nearly all the facial muscles sympathized ; and frequently the glosso-pharyngeal nerve through the otic ganglion affected the muscles of deglutition. Mr. Gaine concluded by observing that he thought much light might be thrown upon the pathology of these cases, which were closely mixed up with hysteria, by a pathological investigation of the connection of these nerves with the sympathetic.—*Reports of Association of Surgeons practicing Dentistry, in British Medical Journal.*

Facial Paralysis following Extraction of a Tooth.—J. F., aged twenty-five, warehouseman, had the second molar in the lower jaw on the right side extracted for toothache on January 13th at 8 p.m., by a dentist in Glasgow. On the following day he found what he described as a "stiffness" in the left cheek, which increased daily. There was a considerable amount of bleeding after the extraction, which continued for two days; it then ceased, and began again on the third day, and continued during the whole of that day and night; it then ceased entirely. As matters were becoming worse, he again called on the dentist on the 22d, who pronounced the right side of the face to be at fault, prescribed a dose of salts, and desired him, if there were no improvement on the second day afterwards, to come back and have the first molar on the same side extracted, as this was thought to be the *casus morbi*,—a small fleshy tumor appearing in its center. No improvement took place, and on January 24th he consulted me. I found complete motor paralysis of the left side of the face. He had great difficulty in eating, as the food always lodged in the left cheek ; in drinking, as part of the fluid ran out of the mouth at the left side. The left eyelids were quite immovable; the left side of the tongue hung curving down and inclined towards the right side. The usual experiments in such a case gave the usual result. In addition to this motor paralysis, there was diminished sense of taste in the left side of the tongue.

A shade was placed over the eyeball to protect it, and quinine in grain-doses four times a day was ordered. Under this treatment he rapidly improved, and on February 4th was able to return to business, there being then little trace of the malady. On February 8th, when I saw him last, he was perfectly well, both motion and sensation being completely restored. He had taken in all sixty grains of quinine.

Remarks.—This case, so far as I have been able to determine, is unique as to its probable cause; for there can, I think, be little doubt that it was primarily due to the extraction of the tooth. At a previous time he had had a tooth taken out, and then also there had been bleeding from the cavity for several days; but no other evil result had followed. Of course there remains the possibility of its having been a coincidence, not an effect; but what, then, was the cause? He was not in ill health; he suffered at that time from nothing but the toothache. In regard to treatment, this is the third case of facial paralysis in which I have administered quinine only, and used no counter-irritation, no blistering, and no faradization; and they have all done well, and that rapidly. It is curious to note that from January 13th to 24th there are eleven days during which matters were undoubtedly becoming worse; and that from the 24th, when the treatment was begun, up till February 4th, when the cure was virtually complete, there are also eleven days. Was this a simple coincidence too; or is it an evidence of periodicity in what may be called traumatic paralysis?—*J. Stuart Nairne, in British Medical Journal.*

Conservative Surgery in Operations on the Lower Jaw.—After a protest in favor of conservative surgery in operations for tumors of the lower jaw, on the score that many, especially those classified under the term epulis, do not involve the entire thickness of the maxilla, Weinlechner (*Allgemeine Weiner Medizin. Zeitung*, May 21st) narrates a case of fibro-chondroma of the upper and lower jaw in which, after removal, it was found that the thickening of the lower jaw was produced by hyperplasia of the bone substance, and that the removal of the entire thickness of the jaw, which had been practiced, was not required in that particular case. Some time afterwards a peasant boy eighteen years old presented himself. Two years before, he had noticed in the vicinity of the first molar on the right side a painless tumor of the size of a small bean. The swelling steadily increased, and rendered mastication difficult. On admission to the hospital, the tumor was found to occupy the external surface of the lower jaw, from the lateral incisor to the second molar. It overlapped the teeth; the jaw was distended by the growth. The tumor was smooth, painless, and covered by the distended bone. The plan of operation consisted in removing the external lamella of the lower jaw, and then the tumor itself, leaving the internal table to give support to the parts and to obviate deformity. An incision was therefore made along the ramus of the jaw, from the angle to the chin. After chiseling off the external covering of bone, the tumor was readily shelled out of a central cavity, connected with several diverticula so as to cause the tumor to resemble an arborescent lipoma in shape. The cavity was well scraped out, and then washed with a twenty per cent. solution of chloride of zinc. On microscopic examination, the growth proved to be a myeloid sarcoma (epulis interna). A very fair recovery followed, and, as the author points out, the result, as regards the function of the jaw, is immensely better than it could be were the entire thickness of the maxilla removed.—*London Medical Record.*

Cyst of the Upper Jaw.—A man, twenty-four years of age, presented a fluctuating swelling of the size of a walnut on the right side of the face half an inch below the orbit. In the mouth, the tumor projected along the outer margin of the gum; it was fluctuating and not painful. This had been noticed during the last two and a half years, and had been lanced twice, when "stuff like coffee-grounds" is said to have been evacuated, but the wound was not kept open. Adjacent to the tumor was a carious bicuspid which had not been tender, but the man had some face-ache three years ago, *i.e.*, before the formation of the cyst. The canine tooth was absent on this side, the lateral incisor being in contact with the bicuspid, and there was no history of its extraction; possibly then the cyst may be dentigerous. There was no discharge from the nose or other sign of disease of the antrum. A seton was then passed through the cyst from the mouth by means of a curved needle, and a clear slightly yellow mucoid fluid was evacuated. A crater of bone was then felt surrounding the cyst at its base. Probably the adjacent carious tooth will have to be extracted. A radical measure would be to lay the cyst freely open and stuff it with lint. A finger in the cyst would enable the diagnosis to be confirmed.

A young woman came under treatment a month ago with a mucous cyst of the upper jaw of two or three years' growth, producing considerable deformity. It had previously been lanced two or three times. A seton was inserted and tied in; clear mucoid matter exuded, suppuration followed; a carious tooth adjacent was then extracted. The patient is now free of all trouble but a depression in the maxillary bone.—*Guy's Hospital Reports, in British Medical Journal.*

EXCESSIVE SALIVATION DEPENDENT ON RANULA.—A young woman five months pregnant suffered severely from profuse salivation, which was attributed to the pressure of a large ranula on the right side. A piece of the cyst-wall of the size of a shilling was clipped out, giving vent to a considerable quantity of glairy fluid. Slight local inflammation followed, but soon subsided. The salivation then completely subsided.—*Mercer's Hospital Reports, in British Medical Journal.*

EPULIS TREATED BY ELECTROLYSIS.—Mr. Nunn read notes of cases of epulis treated by electrolysis. He remarked that this mode of treatment was peculiarly applicable to epulis, where ordinary operative measures are frequently more or less complicated, and attended with considerable hemorrhage. The first case was that of a lady in whom a sensitive and vascular growth, the size of half a walnut, prevented the adaptation of artificial teeth. The patient declining any operation by the knife, the electrolytic treatment was carried out. There were about twenty sittings; six or three cells were used. The tendency to bleed diminished with the progress of the treatment. The pain caused by the current was in proportion to the number of cells employed; it was unbearable when bone or periosteum were touched by the needles, and it ceased immediately on their withdrawal. An injection of chloride of zinc produced intense pain and subsequent irritation. The patient was enabled to wear the artificial teeth after the treatment. Case 2 was one in which an epulis occurred in the upper jaw after removal from the lower jaw. Electrolysis, at thirty-two sittings, caused diminution of growth sufficient to enable artificial teeth to be worn. Case 3, a lady fifty-three years of age, under the care of Dr. McOscar, with a soft vascular tumor growing from the alveolus of the last molar tooth, and extending over the hard palate. The electrolytic treatment was steadily pursued for eight months, and Mr. Nunn showed casts representing the progress of the case, all that now remains being a small indurated and painless mass. Mr. Nunn lastly referred to a fourth case, now under treatment at the Middlesex Hospital. He advocated electrolysis in these cases mainly on the grounds of its painlessness, ready applicability, and freedom from hemorrhage.—*Proceedings of Clinical Society of London, in the Lancet.*

VILLATE'S MIXTURE IN THE TREATMENT OF SINUSES.—A report from the Charity Hospital, New York, in the New York *Medical Journal*, states that several deep sinuses have recently been under treatment in the surgical service, in which no necrosed bone could be found, but which proved intractable to heal. Villate's mixture was tried, first of half strength, then of full strength. In some of the cases it proved of value, in others it failed partially or completely. The case in which it proved of most service was one of deep sinus in the neighborhood of the hip joint. The original composition of the mixture was—

℞.—Liq. plumbi subacet., ℥j;
Zinci sulph. cryst.,
Cupri sulph. cryst., āā ʒss;
Aceti vini albi, fl℥vjss.

The mixture was injected once a day, and proved a more satisfactory application than any other. Some patients complained of severe pain, others felt but slight inconvenience from it.—*Medical and Surgical Reporter.*

Action of Iodoform.—Dr. Sigmund, of Vienna (*Deutsche Med. Wochenschr.*, Aug. 10th), has used iodoform with very successful results in ulcerative and indurative processes, glandular swellings, rhagades, and gummata. He employed the following formulæ: Iodoform and spirit, each one part, glycerin 5 parts; or 1 part of iodoform in 3 or 4 of sugar; or 1 of iodoform in 5 of vaseline; or iodoform collodion (1 in 10 or 1 in 15). The pain was unimportant; the surface of the sores became clean in from twenty-four to forty-eight hours, and granulated favorably. The offensive smell of diphtheritic and cancerous ulcerations was entirely removed by the remedy. Dry iodoform in powder, applied to fresh wounds, forms an uniform, firmly-adherent paste.—*British Medical Journal.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Will some one give me some hints as to the best method to overcome the nausea caused by wearing a plate in the mouth? I have a patient who suffers constantly from this cause. She has tried to overcome it, and I have tried everything I could think of, but the moment she places it in her mouth she becomes sick.—W. H. W.

In spite of all my care I am greatly annoyed by dark joints in repairing plates which have been worn. I suppose the trouble is due to the charring (carbonizing) of particles of food under the blocks. Can any one give a remedy?—C. W. S.

Reply to R. K. B., who asks in the November (1878) number of the Dental Cosmos how to bleach teeth.—When the discoloration of a tooth is caused by the infiltration into the dentine of the decomposed pulp, it is apparent that the bleaching agent must be sent into the dentinal tubules to reach and act on the stained dentine. In such a case prepare the tooth by drilling out the nerve-canal to within about one-sixteenth of an inch of the apex. Cleanse and plug up the end of the root with cotton, to prevent the application from passing through the apical foramen. Put a rubber dam on the tooth; saturate a pledget of cotton with Labarraque's solution; place it in the cavity, and plug it up tightly, leaving it in a half-hour or longer if necessary. Oxalic acid in solution is sometimes used in the same way, also chloride of lime. Oxalic acid, however, acts readily on the enamel and should be used cautiously. Labarraque's solution when used should be fresh and strong.—P. L. FOOTE, *Ithaca*, *New York*.

REPLY TO W. R. H., who asks how to prevent dark joints between sectional teeth, caused by the penetration of the rubber.—Have your lathe close to the window, and make tight joints inside and out, so that the rubber cannot enter. I have found that, when there is red lead in the wax, if the rubber comes in contact with it, it turns it a dark lead color.—A. J. WAID, *Monmouth*, *Ill.*

REPLY TO E. J. PERRY (see "Hints and Queries" for December, 1878).—I offer the following history of a case similar to his: After the case had baffled all ordinary tests, I discovered that a nerve-fiber was exposed near the center of the grinding surface, where there had been a small portion of the dentine removed in finishing. The point of exposure was so small as to almost defy detection. I applied nerve-paste to this point for a few hours, which stopped the pain, but devitalized the entire pulp also. Upon refilling I found the point of exposure was an eighth of an inch from the body of the pulp. When Dr. Perry discovers the cause of the pain he will please report in "Hints and Queries."—W. E. DRISCOLL.

REPLY TO E. J. PERRY.—The history given suggests ossification of the pulp or nodules of secondary dentine in pulp-cavity.—W. H. T.

SOME weeks since, Lieutenant D., of the United States Army, about twenty-six or twenty-eight years of age, of sanguine temperament, measuring six feet in his stockings, and decidedly well proportioned, applied to me for relief from odontalgia, stating that he had been suffering for several days. Upon examination I found a superb set of strong, regular, well-formed teeth, without the slightest obvious cause for pain. There were some five or six small cavities, which had been filled with gold, all of which, with one or two exceptions, had been in some years. The pain complained of was in the first right inferior and the second left inferior molars. Each of these teeth had a small gold filling in the crown. As the left tooth was the most painful I took out that filling first, thinking possibly decay might have been going on underneath. Upon its removal, however, I found no decay whatever. The filling was not larger than the head of a pin, and hardly extended through the enamel; in fact, I do not think the tooth ever needed filling at all. There was some soreness in the tooth when tapped with an instrument, as was also the case with its fellow. I attempted to drill into the cavity, but the dentine was so acutely sensitive that he could bear it but a very little while at a time. I succeeded finally, however, in enlarging it sufficiently for medication, thinking to allay the sensibility. He told me he was on sick-leave, and was being treated for his ears by an eminent aurist of New York, who was giving him mercury, and that he was so much improved that he expected to join his regiment in a short time. I suggested that the tooth-trouble might be mercurial, but he informed me that he had had the same trouble over a year ago, and to such an extent that he would have had the teeth extracted had he been where it could have been done. As it was he was obliged to bear it, and the trouble in time passed off. Each time the adjoining teeth were sore and became elongated. He said his teeth were always very sensitive to acids, so much so that he could not eat fruit of any kind with any degree of comfort, and at times could not eat it at all. The only diagnosis I could make was congestion of the pulp, from what cause I could not tell, nor did I find out satisfactorily. He had never received an injury and had always been in good health until the present time. In a day or two I removed the filling in the opposite tooth, and found it (the filling) quite loose, and the tooth slightly decayed under it. Upon drilling into the cavity I was surprised at not finding the slightest sensibility. I opened into the pulp-chamber and found, as I had anticipated, that the pulp was highly congested. Actual contact with an instrument showed slight sensibility. I medicated and sealed it up for two or three days, and then extracted the pulp, and subsequently put in a temporary filling. In the mean time I had succeeded in enlarging (though with great pain) the cavity in the second molar sufficiently to medicate it, but could not allay the pain. Every day or two I would cut a little away, and again medicate in the usual manner. I tried every method and every remedy, until one morning about two weeks later I was obliged to extract the tooth, as he declared himself unable to bear the pain any longer. The moment the tooth was extracted all pain ceased, and he had no further trouble while here except an occasional slight pain in the other tooth. Upon cutting the extracted tooth open I found the pulp very highly congested, more so, if possible, than the other. The tooth, as I have before stated, was perfectly sound, with the exception of the slight cavity mentioned, and externally appeared to be in a healthy state. The congestion and the hypersensitiveness may have been caused by neuralgia, and the neuralgia by the ear-trouble; at any rate, I came to that conclusion. I should be exceedingly obliged if some one would throw some light on the case. To me it was interesting but unsatisfactory, because of the necessity for the extraction of the tooth.—C. H. W.

GRINDING CROWNS OF ARTIFICIAL TEETH.—It is sometimes difficult to procure teeth for exceptional cases without having them carved to order; otherwise it seems necessary to grind them on the crown surface. In such cases the teeth may be made shorter, or narrower, or thinner, even to the cutting away of one-third of their substance by a corundum-wheel. Finish the surface as smoothly as possible with a fine wheel, then use No. 0 emery paper, and finish with pumice-stone, the same as a rubber plate. This leaves almost as good a surface as it had before grinding. If the gums need cutting away, the surface may be finished in the same manner.—A. J. WAID, *Monmouth, Ill.*

I HAVE found so much satisfaction in the use of the Modelling Composition for base plates, that I have thought others might find equal satisfaction from its use in the same manner. I soften a sheet of the composition in hot water, and press it so as to make it fit the cast and vacuum chamber perfectly; remove it gently from the cast; dip it in cold water; replace it in the cast to see that it fits perfectly; then place a little strip of wax upon the ridge, and take the "bite." In case any accident happens to the cast, a new one can be made from this plate, which will fit as perfectly as if made from an impression of the mouth. The composition plate should be kept in a cool place —L. D. DOBBINS.

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ORIGINAL COMMUNICATIONS.

CARIES OF HUMAN TEETH.

BY FRANK ABBOTT, M.D.,

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(Read before the New York Odontological Society, December 17th, 1878.)

For some years I have held opinions differing more or less from those of any writer upon this subject, but have expressed them on but few occasions, except in my lectures before the class at the college. Not feeling secure in the views I entertained, however, I concluded to thoroughly investigate the subject, to either prove my theories correct or abandon them for the *facts* which I expected to establish. Very much to my gratification, my researches have confirmed my former views, with very little if any variance. Notwithstanding the fact that nearly all investigators for many years past, whose writings we have had access to, have accounted for the decay of teeth in what apparently seemed to the profession a satisfactory way, still there were practical facts which led me to view the subject differently, and which it was difficult to account for from their stand-point. These facts I have attempted to account for in this paper. I have been careful to make no statement which I am not able to prove to any one who will take the trouble to *carefully study* the specimens under the microscope.

Before entering upon the consideration of the subject, however, I wish briefly to recapitulate what has recently been discovered by Dr. C. F. W. Bödecker in the minute structure of human teeth. The reasons why I do so are, that not only my own researches are corroborative of Bödecker's discoveries, but a full understanding of the morbid processes is possible only upon a correct knowledge of the normal conditions.

Since Dr. C. Heitzmann brought to *evidence* that, with the exception of dry horny tissue (epidermis, nails, and hair), all *other* tissues of the living body were endowed with life, and that the presence of living matter was demonstrable not only in the formerly so-called cells, but also in the basis-substance (matrix), the question arose whether a normal tooth, attached to a living body, was not possessed of this same living matter in itself. It was to be expected, judging from the phenomena of growth, of decay, of restitution, etc., that a tooth was provided with such living matter just as well as bone, which it resembles so greatly in its minute structure. But the full evidence of its presence in the tissues of the tooth was first demonstrated by the above-quoted gentleman.

The dentine is traversed by innumerable canaliculi, which ramificate both toward the enamel and the cement. Each canaliculus contains a delicate fiber of living matter, which is in direct connection with the protoplasmic formations within the pulp-cavity, with the offshoots of the cement-corpuscles, and the fibers between the enamel-rods. Every dentine-fiber sends innumerable delicate conical threads through the cavity of the canaliculus into the basis-substance between the canaliculi, where a very minute network of living matter is present, uniting the dentinal fibers with each other throughout the whole tissue of the dentine. The basis-substance is analogous to that of bone, therefore glue-giving, and at the same time infiltrated with lime-salts. Around each dentinal canaliculus the basis-substance is denser than between the canaliculi.

The cement is identical in every respect with bone; its basis-substance is traversed by larger cavities, which contain nucleated protoplasmic bodies,—the cement-corpuscles. From these arise larger offshoots in a radiated arrangement, and the protoplasmic body as well as all its larger ramifying offshoots send delicate offshoots of living matter into the basis-substance, which latter is pierced by a network of living matter, this being in uninterrupted connection with the network within the basis-substance of the dentine, the boundary being termed formerly the interglobular space; by Dr. Bödecker, "interzonal layer."

The enamel is provided between its polyhedral rods with very slender fibers of living matter, which also send extremely delicate offshoots into the basis-substance of the rods. Such offshoots traverse the cement-substance between the rods, and form an extremely minute network of living matter within the rods themselves, its meshes being occupied by dense depositions of lime-salts.

Again, the network of living matter of the enamel is in direct union with that of the dentine, and, on the neck of the tooth, with the network of the cement. From these facts it necessarily follows that we must consider a tooth which is normal in its structure, and in close connection through the periosteum with the jaws, as a living body; consequently, it follows that morbid processes will result in a reaction of the living matter in the tooth just as well as in bone or any other living tissue of the body. What this reaction essentially consists in during the process termed caries I have, to my own satisfaction at least, pretty clearly *settled.* And it occurs to me that, through my researches, new stand-points have been revealed of considerable value, both for abstract science and practical use.

Methods.—The results recently obtained with regard to the minute structure of the teeth have been arrived at by *new methods.* As a matter of course, dried specimens of teeth, formerly almost exclusively in use, did not reveal any of the soft parts within the hard dental tissues. Only a frame of the tissue was left, and we may readily understand why the investigations of the carious process as yet have not passed above hypotheses and speculations.

For preparing dentine and cement, there is no better method known than slow decalcification by means of a one per cent. solution of chromic acid. In my experience large quantities of this solution are needed for a few teeth. A few drops of hydrochloric acid may be added to the chromic acid solution every other day, in order to hasten the decalcifying process. And the solution itself should be changed frequently, say once every week. The process of decalcification ought to proceed very slowly; so much so, that at least two months should be required for preparing the superficial layers of the tooth for cutting with a razor.

The teeth thus prepared I imbedded in paraffin, with a small quantity of wax added, after the water had been extracted from them by strong alcohol. The sections obtained from such specimens I stained with carmine, this being, in my experience, the best method for the demonstration of the carious condition of the tooth. After this I mounted the specimens in glycerin, diluted one-half with distilled water, and lastly inclosed them with ordinary asphalt varnish.

The enamel of teeth prepared in the foregoing manner can never be cut, because it becomes extremely brittle; therefore, I was obliged to resort for its examination to the method first practiced by Dr. Bödecker, which essentially consists in splitting *perfectly fresh* teeth, by means of a saw, into thin lamellæ, and grinding these down to the necessary thinness, always under water. The thin slices should be kept for decalcification, for twenty-four hours, in a very dilute solution of chromic acid. A saturation of this solution of over one-half of one per cent. in my opinion is deleterious to the enamel, which if *completely decalcified* shows only a *minute network* of *living matter*, as I first have observed, but no trace of the enamel-rods and prisms.

A little practice will enable any one to obtain ground specimens of a whole tooth, of such extreme delicacy that they are fit for even the highest magnifying powers over one thousand. A perfectly transparent condition should be the main property of a specimen of a carious tooth, because only with such specimens are we enabled to study the minutest changes of the tissues to our satisfaction. Ground specimens can be stained with carmine and mounted in the same way as those obtained by cutting.

The former method of mounting specimens of teeth in damar varnish or Canada balsam has proved so very unsatisfactory, owing to the high degree of the clearing process, that it has been abandoned by our best microscopists. This method was good enough for dry specimens of teeth, in which the compartments in the dentine and enamel were filled with filth and air; but as we nowadays wish to see more of the soft tissues within the hard framework, we employ the only reliable methods as yet discovered, as described above.

Etiology.—Although the examination of a carious tooth can reveal the cause of the disease only to a limited degree, I do not hesitate to express my conviction in this respect, on the foundation of twenty years of practical experience.

There is not the slightest doubt in my mind as to the origin of caries of teeth. The first lesion under all circumstances is due to the action of an acid, which in a merely chemical way dissolves out the lime-salts from the enamel. No doubt quite a strong acid is necessary for decalcification of so solid a tissue as the enamel of a tooth. And the question often arises, Where does this acid come from?

First let us take into consideration the starting-points of the morbid process. I fear no contradiction on the part of my professional brethren when I say caries never begins on the smooth surfaces of a tooth, which are exposed to the friction of mastication, but always starts on points which, owing to their anatomical structure, form receptacles for food, etc., or on points between the teeth where, owing to want of cleanliness, decaying material can accumulate. It is therefore not to the friction between the single teeth (Salter) (which, as we know, is possible to a certain extent in the normal condition), but to the acid generated from the decaying material retained between the two flat or concave surfaces which the teeth present to each other, that the beginning of the destruction of enamel is due.

That this decaying material may be sought for and found in the food I think will hardly admit of a doubt; and, as it occurs to me, mainly in such kinds of food as through their decomposition are apt to produce an acid, not very strong, perhaps, in itself, but possessing a high degree of affinity for lime-salts, viz., lactic acid.

First among the varieties of food ranks meat, which by putrefaction may produce free lactic acid; next are the saccharine materials; and last the amylaceous, which being converted into dextrine by the action of the saliva, may be transformed, if brought in contact with putrefying meat, into lactic acid. There is no doubt but that the organic portion of teeth, as it advances to the stage of decomposition in the process of caries, plays a very important part in the formation of this acid.

Perhaps the sour decomposition is assisted locally by the action of micrococci and leptothrix; although these organisms are known to prosper only in alkaline, and not in acid fluids. These vegetable organisms are present in innumerable quantities on the healthiest gum; tartar is crowded with them. And even in the highest degrees of development of tartar *caries* is *absent.* In fact, when decayed cavities in teeth become filled with tartar, the carious process is as effectually stopped as it is possible for it to be when such cavities are *filled* in the most perfect manner, with gold or any other favorite material. Hence I do not consider the views of those authors correct who claim that micrococci and leptothrix play any important part in producing, or even supporting, the carious process.

I fully concur, however, with the views of those who claim that the resistance of the teeth against caries, owing to their amount of lime-salts, greatly varies in different people. The hue of the teeth, as is well known, is indicative to some extent of their amount of lime-salts. The microscope shows a considerable variety, with regard to the presence or the degree of density, of that layer of the basis-substance surrounding the dentinal canaliculi. E. Neumann first drew attention to this layer, which sometimes is so dense and so well defined, owing to its greater refracting power than that of the basis-substance between the canaliculi, that it may be regarded almost as a protecting sheath to the living matter within the canaliculi. This layer is well marked even in fossil teeth; it resists somewhat the action of strong acids and alkalies, but it is almost completely absent in a number of carious teeth which I have examined. I have also remarked that different teeth, treated exactly in the same manner with chromic acid solution, become soft in a markedly shorter space of time than others. The general health or constitution may have considerable influence upon the quantity of lime-salts deposited in the basis-substance of the teeth, although it has been claimed that people of so-called scrofulous and tuberculous constitutions on the average have better teeth than strong and vigorous persons.

Nations of high civilization, which inevitably leads to bodily and mental deprivation, as a rule have a greater percentage of carious teeth than those of a low degree of culture, or with no culture at all.

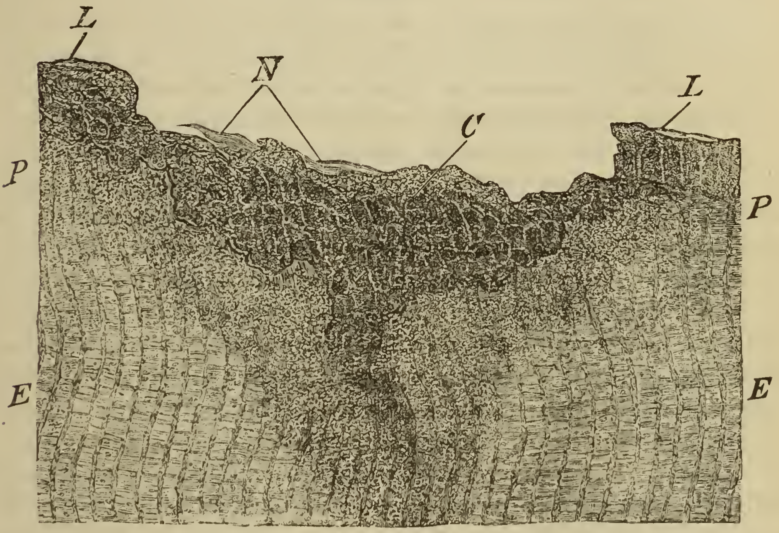
However this may be, the fact that caries of the teeth begins as a chemical process scarcely will, in my opinion, be questioned. On a dead tooth, natural or artificial, as well as on teeth manufactured from the dentine of the elephant or the hippopotamus, the process will remain, under all circumstances, a chemical one, assisted only by the putrefying remains of the organic material of the tooth; while on a live tooth either acute or chronic reaction-changes take place, which I intend presently to consider.

Caries of Enamel.

The clinical phenomenon of caries, in its very origin, consists essentially in a discoloration of the enamel. A whitish or grayish spot on the surface of the enamel is indicative to an experienced eye of the beginning of decay, which spot proves when touched with an instrument to be soft and crumbly. Often a brown spot is visible on the enamel as a sign of the softening process. The less pigmentation present, the more rapid is the process of decay. On the contrary, the more distinct the discoloration, the slower is the softening process. Nay, dark-brown spots may be present in the enamel for many years without being followed by softening. The brown discoloration, as such, cannot be considered as an essential feature of caries of enamel, but it usually accompanies the carious process, and does so the surer the slower the morbid process runs. On microscopic specimens we meet with decayed pits in enamel without any discoloration of this tissue. On other specimens we have a very marked orange or brown hue on the decayed part as well as in its neighborhood, and sometimes scattered specks are to be seen some considerable distance from the diseased part. The brown discoloration is located in the basis-substance of the enamel-rods, the outlines of which are much more marked than when in a healthy condition. The interstices between the rods here are plainly visible even with a magnifying power of only five hundred diameters. This power will reveal delicate beaded fibers of living matter within the interstices, which in healthy enamel can be seen distinctly with a power of eight hundred to one thousand only. Besides the discoloration, no material changes are seen on the enamel-rods.

What process the pigmentation of the enamel is due to I cannot say, but it occurs to me that we have no right to look upon this process as a merely chemical reaction upon the basis-substance of the rods. That in fact it is the basis-substance holding the pigment, and not the lime-salts deposited therein, is proven by specimens from which the lime-salts by chromic acid have been extracted to a considerable extent, and which still show the brown stain. I dare say that this brown discoloration is a strong proof of the presence of life in the enamel, as in teeth where the pulps are dead such stains never appear, nor can they be produced by artificial means. The process of decay in the enamel can best be studied on superficial erosions of the same, a sample of which I have illustrated. In this instance the brown discoloration of the decayed part was but trifling, and entirely absent in its vicinity, so that we have to consider it as a case of acute caries.

FIG. 1.



We see at *E*, *E*, Fig. 1, the unchanged enamel partly deprived of its lime-salts. Toward the periphery a zone appears in which the enamel-rods are spotted, evidently owing to their partial decalcification. Close to this and immediately below the decayed part (see *P*, *P*) a zone is visible in which the enamel is granular, and looks precisely like normal enamel from which, by a somewhat stronger solution of chromic acid, the lime-salts have been dissolved out. Here the protoplasmic condition of the enamel is re-established simply by decalcification, and there is no doubt that this is the very condition of the enamel by which the white spot is produced upon the surface while the tooth is still in the jaw. On the boundary of the enamel we see a shallow depression (*C*) filled with protoplasmic bodies, which represent either complete enamel-prisms or lumps of such prisms. All these protoplasmic formations are united with each other by delicate threads; they exhibit but a slight brown discoloration, they readily imbibe carmine, and if the specimen be stained with a half per cent. solution of chloride of gold these bodies assume a dark-blue tinge, while the unchanged enamel is but little affected by this reagent. On the outermost layer we see several flat epithelial bodies (*N*) attached to the protoplasm, which in the transverse section look irregularly spindle-shaped, and are evidently the remnants of the so-called Nasmyth's membrane, or enamel-cuticle, sunken down with the decaying protoplasm. On the level of the enamel we also recognize such flat epithelia (*L*, *L*). Beneath them on the right side of the drawing there is present a zone of decalcified enamel, while on the left side the division into protoplasmic bodies is fully accomplished.

Not a trace of micrococci nor of leptothrix is visible in or above the decayed pit of the enamel, which again proves that these organisms do not play any important part in the process of caries; at least, do not materially interfere with the tooth in its normal condition.

The way in which the caries proceeds downward is plainly shown by the figure. There are small, irregular, bay-like excavations on its boundary, and in the midst of the decayed part a wedge-shaped elongation is running downward into the softened enamel. The shape in which caries appears in the enamel is, however, greatly varying. Besides the wedge shape as illustrated in the wood-cut, the forms in which caries proceeds are shallow or conical excavations, excavations with abrupt walls, fissures, and grooves. On the bottom of the main excavation we sometimes see a smaller cavity, it being in a narrow or wide communication with the main decayed mass.

Besides the peculiar medullary elements forming the contents of a carious cavity of the enamel in its initial stage, I not very rarely have met with dark-brown, irregularly-shaped clusters filling the whole cavity. How such changes of medullary corpuscles are produced I am unable to say, although it seems to be kindred to the so-called *colloid* or *hyaloid* metamorphosis which we observe in other tissues, the only difference being that in caries the colloid clusters are deeply saturated with a uniform brown pigment, the origin of which, as mentioned above, is unknown.

(To be continued.)

DENTAL PATHOLOGY AND THERAPEUTICS.

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[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S.,
in the office of the Librarian of Congress at Washington.]

(Continued from page 7.)

XVII. *Action of virus.* Miasmatic—syphilitic—typhoid.

1st. *Miasmatic.* In accepting this term as indicative of that form of *virus* which gives rise to intermittent or remittent *periodic* disease, I wish it to be understood that I do so only because I recognize that I shall thus be most generally understood; but I desire to state that I regard this convenient term—*miasma*—as one calculated rather to mislead than to educate, and its tripod basis of "heat, moisture, and vegetable decomposition" as anything but solid.

That the peculiar forms of disease known as "periodic" are of *zymotic* origin I am decidedly inclined to believe, but that their excitant is taken into the system exclusively through the medium of respiratory action I as decidedly doubt.

Be this, however, as it may, the effect of the deleterious poison is most tangible, and, concomitant with the other debilitating and distressing symptoms, we have an occasional peridental irritation which is of sufficient frequency and intensity to merit attention in this connection.

By frequent interchange of views with practitioners located in sections where so-called malarial troubles exist, and with others settled in localities where such forms of disease are practically unknown, I have been led to note a decided excess of peridental complications in the practice of the former over those reported by the latter.

Not only has this seemed quite evident, but the character of a large majority of the cases of periodontitis occurring in miasmatic districts has been such as to require much more decided skill in combating them, and even with this to more frequently defy all treatment and result in loss of the teeth.

I think it may be assumed as the reason for this, that the *average strength* of vital power is much diminished by the constant action of the insidious poison, and the consequent indisposition, and indeed inability to bear the increase of *special* to *general* uneasiness.

In these cases I have also noted that the *pulpless teeth* are markedly prone to give trouble; that with these, causes for irritation, almost too slight for recognition, will be sufficient to produce serious, and sometimes uncontrollable inflammation, and that they are often the seat for such frequent recurrence of annoyance as to render their extraction much more desirable than their preservation.

As I have intimated, the *treatment* of periodontitis which is complicated by miasmatic control, usually demands much greater exactitude than is required when one is aided by an ordinarily recuperative power, but it will be found of great advantage in these cases to aid dental treatment by recourse to the usual antiperiodics.

Of these quinia, perhaps, still deservedly stands at the head of the list, but I am averse to the employment of this powerful tonic unless it is *absolutely* indicated; when used it should be in less quantity than is indicated for the treatment of actual "chills," and yet in greater quantity than would be regarded as sufficient for a mere tonic; a decided systemic impression is desirable, but it is undesirable that great stimulation should be indulged in.

I have for many years relied almost exclusively upon *capsicia* as a tonic antiperiodic in malarial periodontitis, given in $\frac{1}{100}$th grain doses, five or ten times daily, according to age of patient and gravity of demand, for three, five, or ten days, and combined with colocynth and chinoidin.

From this combination I have had the best and most persistently good results which I have ever obtained, and it has been thus more as experimental than as really needful that I have occasionally resorted to other remedies.

Of these I may mention as worthy of note, cinchonidia sulph. and eucalyptus, as I have had excellent results from the use of each of these two comparatively new medicaments.

I have also during the past few years recommended to patients subject to intermittent the greatest possible abstinence from *raw water*, and have obtained sufficiently better results in a number of instances to warrant a continuance of such directions as quite an important adjunct to other treatment; in several cases the complete abstinence from the ordinary drinking-water of the locality, the very limited use of rain-water, and the free use of soups, tea, coffee, etc. (all of *boiled* water) has not only resulted in almost complete alleviation of frequently recurring general tooth tenderness with semi-annual periodontitis, but has established a condition of systemic non-impressibility to *malaria* (?), which nearly precludes the necessity for any other preventive medication.

2d. *Syphilitic.* Of all the forms of disease found in the range of dental pathology, no one I think equals in objectionable characteristics that of syphilitic periodontitis.

With the general appearance of the cavity of the mouth of a patient affected with "tertiary syphilis" I shall not regard it as my province to deal, as extended descriptions already exist in all the text-books upon venereal disease; but I do consider it my duty to warn of the danger which exists in connection with the treatment of such cases of this trouble as from excessive *tenderness* and looseness of the teeth are brought to the charge of practitioners of dentistry.

Remembering that it is only after six months or a year, and possibly many years of systemic poisoning, that symptoms of tertiary syphilis supervene, it will be conceded that although it is positively asserted that the matter from the suppurating surfaces of tertiary ulcers is not inoculable, and that in no instance has it ever been known to infect by contact, it is nevertheless the duty of the dentist to guard in every possible way against such contact, and to use the most exhaustive precaution in behalf of untainted patients.

I do not now treat cases of this kind, as I am obliged to confine my practice very strictly to purely dental diseases, but in former years I had a sufficiently complete set of instruments which were only used in such cases, and I never again used the mouth napkins which had been once employed with such patients.

It may be true that the specific virus is changed completely from its former condition, and that it is perfectly harmless beyond peradventure; but, with all this conceded, I view the contact with such pus as revolting in the extreme, and feel that I cannot too strongly advocate the exercise, even of *needless* (?) care in this direction.

While it certainly would not be considered as within the scope of dental practice that such cases should be taken in charge for systemic treatment, it may nevertheless happen that an occasional making of a drill-tap, or the correction of a mal-occlusion, or the removal of tartar, or the filling of a cavity impinging upon gum-tissue, might add much to the allaying of an irritation quite consequent upon an expression of tertiary syphilis, and it is in the performance of such duty as this that I would recommend to others the same scrupulous attention to isolating cleanliness which I, myself, formerly employed.

3d. *Typhoid.* This peculiar systemic condition, now so generally accredited to zymotic (spore) influence, has gradually given its characteristic symptoms to almost every form of disease.

It is probably due to the gradual dissemination of this poison, and the consequent necessity for its combating, that such marked changes have taken place in the general practice of medicine as to have engendered a species of contempt for "old-fashioned" treatment, and to lend a fictitious support to the idea that "more enlightened views" have routed the heroic blistering and purging, and above all the constant use of the lancet, which seemed so completely the "cure-alls" of the last century.

It is certainly more just to the intelligence of the great minds of that period, to consider that they had largely to contend with diseases which from their inception ran an acute, sthenic, and plethoric course; that the patients were mainly such as from force of circumstances, had through exposure, comparative hardships, and the life incidental to the settlement of a new country, attained that constitutional vigor which, when stricken by illness, responded in such manner as to demand an equally vigorous effort for control. All this has been so modified by rapid increase of population, change of mode of living, extended introduction of luxurious surroundings, with their infectious emanations, and complete alteration of food, not only in quality but even in kind, that the whole *type of normality* is entirely unlike that of former times, and the *type of disease* has undergone a corresponding transformation.

In like manner has the modification of tooth-tissues and their surroundings compelled radical changes in dental practice, and perhaps in no other direction has this been so marked as in the management of the dental concomitants with "typhoid."

It has come to be regarded as a matter of course, by both general practitioners and patients, that after the graver indications have been met, attention must be given to the teeth, and it is assumed as a natural sequence that great ravages in this direction must have occurred.

Until quite recently it has equally been believed that the powerful acid tonics, which are so effectually given during the treatment of "typhoid" and during the convalescence of patients, have notably contributed to this dental complication, but these direful results have been accepted as by far the lesser of two evils.

More recently some of the modern authorities in dentistry have rejected the theory of medicinal *decay* of the teeth; and, believing with them, while admitting the *generally* injurious effect of acid medicaments upon *enamel*, and directing the antagonizing of this by means of the sure preventive of alkaline washes for rinsing the mouth after taking the medicines, I have advocated the position that the *carious* disintegration of tooth-tissue during and after typhoid is due to the general systemic impress given by the spore inducing the condition.

More than this, I believe that in such conditions the strong acid tonics,—eminently the acid sulphuric,—so far from causing decay of the teeth, tends decidedly toward its arrestation by antidoting the poison systemically and specially.

It is in connection with this general deterioration of tissue that, as in other conditions previously referred to, any peridental membrane predisposed to inflammatory action by any existing local condition or excitant will readily succumb to this additional irritant and assume one of the most uncontrollable forms of periodontitis.

With the whole energy of the sufferer apparently exhausted by this low and lingering form of disease, we have added, seemingly as a crowning effort, a form of toothache which taxes the fortitude of normal strength.

With the recuperative power of the individual at its lowest point, we are called upon to treat a condition, always exacting, with most meager resources for aid to draw upon. Under such circumstances, let me endeavor to impress my readers with the sense of the responsibility which now falls upon the dentist.

It is this additional weight of woe which may hold in the balance the chances for or against the gradual recovery of the patient.

It is upon the *promptness*, *ease*, and *accuracy* of dental treatment that life even may depend in many cases such as these, and it therefore behooves every dentist of the present day that he should study carefully, and endeavor to understand thoroughly, the manipulations and medication incident upon, and the reasons for resorting to, every one of the minutiæ connected with the *treatment of typhoid periodontitis.*

(To be continued.)

THE IDEAL FILLING AND THE "NEW DEPARTURE."

BY A. H. THOMPSON, D D.S., TOPEKA, KANSAS.

To the student of dental progress,—the ever-alert watchman upon the ramparts looking for the aurora of better days,—the "New Departure" movement is invested with great interest. It rises and stands before the profession with an herculean presence, proudly conscious of the embarrassment its disagreeable innovations cause to the conservative forces in the ranks. It will not "down" for threats nor incantations, but, challenged and uninvited, becomes an element in dental economies which must be recognized and studied. Whether the movement will develop into the proportions of a revolution, and whether such a revolution, if developed, will be too formidable for the conservative, governing forces of the profession to resist and subvert, to crush or modify, remains "as a tale to be told." The future can alone reveal the ultimate results and effects of this giant effort of the New Departure, auro-phobic iconoclasts. Granting it every ordinary advantage, the growth of the movement must be slow, for as with all radical innovations, the intelligent, but timid and conservative members of society and of government, will be reluctant to allow of its propagation and encouragement. The prejudiced subclass of conservatives will, of course, fight its progress with great bitterness, and the fanatical leaders of the movement will defend their claims with equal bitterness. Both extremes are the natural outgrowths of the conflict of great principles.

But the calm, unbiased progressionist, who bids us still on and on, looks with interest and favor upon the New Departure movement, for it is an apparent step, at least, in the direction of the attainment of better things in operative dentistry. It may overthrow some gods and break a few shrines, but he bids us let it work. It is medicine to the body corporate of the profession. It is an agitation indicative of sure advance and a valuable impetus towards the ultimate consummation of that much-desired result and end, *i.e.*, the production and development of the perfect material—the *ideal filling*—with which to arrest the ravages of dental caries in the human subject. Toward the attainment of this end the true progressionist believes the current agitation contributes greatly, and he wishes the leaders of the movement "God-speed," for their work is good and their labor shall bear fruits.

But it is necessary in a candid study of the claims and principles of the New Departurists to compare the details of their theory with a conception of a perfect standard,—an ideal filling material. It is a conspicuous regret that the materials at present employed by the profession fall far short of the requirements of the perfect filling, and that they are, practically, little more than failures; yet we cling to them with a tenacious despair, for we have nothing better. In this time of demoralization the new religion has come forward and offered us a new creed and new principles, and it is our duty to examine its claims candidly. We have an idea of what is demanded of the perfect filling in order that teeth may be perfectly preserved from decay, and with that ideal we must compare the new creed and what it offers us.

1. We observe, first, that the ideal filling must be, first of all, a *cement*, to the end of the attainment of that perfect consertion with the cavity-walls and margins which alone can produce complete and unmistakable imperviousness to moisture. The experience of the dental operator, especially in the activity and experimentation of these latter years, has demonstrated that the principle of close mechanical adaptation for the exclusion of moisture is, in practice, a failure when put to the slightest strain in soft teeth or difficult positions. The metals employed for filling can only be inserted mechanically, and must, from their nature, depend upon an, at best, approximately perfect mechanical adaptation to produce a moisture-proof junction. Unfortunately, the difficulty of inserting gold or tin in this perfect manner, and the disposition of amalgam to contract or change form during the process of hardening,—or to carry moisture along its entire surface by capillary attraction,—contribute to the creation of water-ways and crevices between the metal and dentos and thus militate against their success as filling materials, except in the most accessible positions in the best grades of teeth. It is also found in practice that the quality of many dentures is of so low and degraded organization that the enamel margins of cavities are soft, spongy, elastic, or brittle, against which the metals cannot be firmly or even well impacted; and that the dentos itself here acts as a moisture-attracting surface, which it is only too ready to absorb and carry under the filling the moment of its immersion in the oral fluids. It is also a sad but well-known fact that the poorer grades of teeth are on the increase among the rising generation, thus presenting a constantly-augmenting demand upon our science and skill.

In the contemplation of these disagreeable facts in the presence of present modes of practice, the calm observer can scarcely do otherwise than conclude that mechanically water-tight fillings, especially "in the teeth that need saving," are a failure, and that the perfect, the universal filling, must be a cement; that it must possess the property in a high degree of clinging to the dentos with a glue-like tenacity, and so incorporate itself inseparably with the substance of the cavity-walls. This quality is the only one which will perform the duty of that perfect consertion which will exclude moisture in all cavities, which will banish the uncertainty and risk of difficult and "hope" operations, which will preserve the teeth needing saving as well as those of better quality, and which will perfectly support and conserve shell-like crowns.

Taking this important property of the ideal filling as a standard requirement, and comparing therewith the materials and methods offered us by the New Departure, we find in their group of "plastic" fillings only the zinc-oxychlorides which approach the fulfillment of this requirement to any appreciable and serviceable degree, and that these fall far short of ideal demands. Some of the varieties of gutta-percha and amalgam possess slightly adhesive qualities, but not sufficient to perform even the first and important duty of excluding moisture. The plastic fillings fail when weighed in this balance.

2. The next quality demanded of the perfect filling is that of insusceptibility to the various disintegrating and destructive forces present in the oral cavity. Gold is the only material in the long catalogue of filling materials which at all fulfills this requirement, and amalgam follows next in degree of indestructibility. This property has brought these metals into most frequent employment for the conservation of carious teeth, and will keep them installed in this prominent position, in the face of many "departures,"—their indestructibility being, in fact, their chief recommendation. Excluding amalgam, the remainder of the plastic fillings possess little resistance, and little permanence can be claimed for them when subjected to even the ordinary and ever-present destructive conditions. In this division the "New Departure" is, perhaps, weakest, and in this it fails sadly to furnish us with anything at all answering to our needs. It has not bettered our condition in the least, but rather injured it, for it takes from us our mainstay of indestructibility, gold. In the perfect filling we must have something even less destructible than gold,—a material both harder and tougher.

3. The next property demanded of the ideal filling, is perfect imitation of, and similarity to, the color and texture of the natural tooth. This includes shades of colors, resemblance of apparent density, gloss, and translucency. It is needless to say that this property has never yet been attained by any filling material offered to the profession. It is also apparent that, to be perfect, this property must be present in completeness in the ideal filling.

The New Departure here offers us nothing. Many of the plastic fillings adopted and championed by the athletes of the new religion are, in a degree, colored to imitate the color of the natural enamel; but no one is deceived thereby, for there is in them little resemblance of color, and none whatever of texture or translucency.

4. The next property demanded of the perfect filling, is the possession of qualities allowing of facility and rapidity of insertion into the cavity, and of rapidity of completion. The material must also be cheap as to intrinsic value. These qualities are indispensably necessary to the end of saving time and the cheapening of the operation of filling, so that "all classes and conditions of men" may be enabled to avail themselves of the services of the dental conservator. These properties the plastic fillings possess in a good, perhaps a sufficient, degree; but the ideal filling must be the product of the work of moments, and not of hours, as under the *régime* of gold. All recent progress has been in the direction of simplifying the operation of filling,—just as all progress a decade ago was toward perfecting it,—but the end is not yet reached.

The *art* of the dental profession need not suffer by this simplification, much as the Ruskins of our ranks are even now exercised over and deplore the degradation of operative æsthetics from the high ground upon which it stood in "the good old days of the fathers." They need not anathematize all innovations, for the ideal filling will be—when it comes, for come it must—in all respects more true to nature and a more perfect product of a higher art than even our jewels of gold (nowadays set in chalk). And, let us whisper, it will be what is far more desirable than the most beautiful operations in gold,—it will be a better conserver of teeth.

5. Another property demanded of it is, that the ideal filling shall be in perfect harmony with the dentos as a conductor of thermal, galvano-electrical, and other physical disturbances, to the end that the healthy equilibrium of the dentine and pulp be not altered in the least. This property is possessed by none of the materials at present in use, some being better, others worse conductors than the dentos, and the endless incompatibility thus exhibited is productive of untold mischief. But the perfect filling must possess immunity from this susceptibility to physical shocks and changes fully equal to, and in harmony with, that of the dentos, for reasons apparent to all.

Great stress is laid by the New Departurists upon the potency of electrical inharmony to produce caries, and, to a degree, with justice and reason. But their devotion to this one idea seems to have developed a habit of excluding and ignoring all others, including that of thermal changes,—an influence equally as potent in its way as electricity, and which should receive fully as much attention. We cannot elaborate the many ways in which it acts,—thermal shocks to the dentine and pulp, galvanism as induced by thermal changes, etc.,—but must merely suggest these things. It is possible also that light—the quantity admitted into the oral cavity being so continually variable—may exert some influence upon fillings *in situ*, and induce thermal, electrical, or other changes or disturbances. Physiological physics is entitled to a full, and not a partial, consideration in the solution of the problem.

The plastic fillings and their champions offer us no perfect material in this respect, and we must bide our time until the perfect filling appears.

It is, of course, evident that with our earnest labor and seeking after the good in many and various channels, we must in time attain to the production of the ideal, the perfect filling, as it is our duty and purpose to do. We have been drifting toward this goal very rapidly of late years, and the extensive experimentation being carried on in the name of the perfect filling must surely be the earnest of ultimate success, and fills the progressionist with hope.

But in the galaxy of materials offered us in the creed of the new "plastic" religion there are none which yet approach ideal requirements in any particular, and we are in consequence impelled toward the belief that the New Departure fails of its self-imposed mission. The movement is, without doubt, a mighty stride in the right direction, but it fails of the goal. The leaders may disclaim any profession of perfection, and say that their principles, methods, and materials are only provisional and expedient, and subject to alteration according to the laws of development and progression; but if this be so, their heralds misrepresent them, and we consequently misjudge them. We must but take them at their word and formulate our comparisons accordingly. We must state the points of their weakness clearly and concisely. We find their principles weak in the want of system and scientific thoroughness and simplicity. We find that their experiments are empirical and unscientific, inasmuch as that they are directed toward the attainment of no given result or end. There is no assumed or theoretical standard of perfection toward which they may work and which they may aim to reach. They test this and that material as it comes to their hands, and seek the discovery of nothing new. They are wedded to those materials which they found in use, and only endeavor to bend them to "plastic" requirements. They have attempted a radical reformation, and do not proceed upon thoroughly radical principles. The *newness* of the auro-phobic creed appears in nothing but the exclusion of gold,—a more than doubtful blessing unless they give us something better than we yet possess.

The perfect filling is easily conceived of, for the requirements of its composition are simple, the conditions to which it is subject in the oral cavity are well known, and the properties demanded of it are easily named. The factors being thus well known, we of the rank and file of the profession demand that the perfect filling be forthcoming, in order that we may the better perform our duty and meet the reasonable expectations of all people who seek our services. The science of our day is not a failure; chemistry is not a dream. The "triumphs of mind over matter" have not ceased. And with faith yet vested in the intellectuality of our species, we stretch forth our hands towards the Edisons of our profession and pray them give us that which we need,—the perfect filling.

In the mean time let the New Departure, and all other agitations which tend toward the bringing of those better days, be fostered and encouraged for the good there is in them, for each one represents a step upwards and onwards.

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

(Continued from page 608, vol. xx.)

VIII.

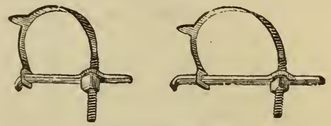
Tools and Materials.—Application of Fixtures.

For the instruction of the younger members of the dental profession, as well as for answering numerous inquiries, constantly received, concerning the tools and materials necessary for the construction of regulating apparatus on the Positive Plan, a paper upon the subject has seemed desirable.

The reader will do well first to thoroughly understand the principles involved, as laid down under the head of "Application of Forces" in the Dental Cosmos for June, 1878, page 304. Fixtures illustrated thus far in the Dental Cosmos may be made of silver, platinum, or gold. I generally use eighteen-carat gold, and, except for swaged plates or parts of plates which require plate-material, the various parts are made of square gold wire as procured at jewelry depots, about one-sixteenth of an inch in breadth, which, for bands and the like, is rolled, or, better still, hammered out to the proper thickness, when it is cut to any desired width for use.

Bands.—All fixtures of this sort should be as delicate as possible consistent with the necessary strength. The general tendency is to make apparatus too clumsy. On delicacy and accuracy of fit everything depends. One of the most important points to hold in mind is proper thickness of material. While the anchor-bars (not bands), may be of considerable thickness, those straps which reach from the anchorage to the teeth to be moved should generally be thinner, especially those portions which are intended to slip around the teeth when tightened by the bolts. A disregard of this point may lead to failure.

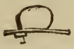
FIG. 36.



Anchor clamps.

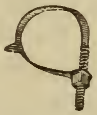
The thickness of bars for molar teeth to which anchor-bands are secured (Fig. 36) should be about Nos. 22 and 23; for bicuspid teeth about No. 34 or 35, and in breadth not greater than is absolutely necessary for strength and firmness, say from $\frac{2}{32}$ to $\frac{4}{32}$ of an inch. (See table.) The thickness of bands for molar teeth is generally about No. 31 to 32, but for bicuspid teeth, as well as for front teeth, they should be thinner, generally from No. 35 to 36, and for retaining bands (to hold teeth in position after being regulated) they should not be more than No. 36 in thickness and $\frac{1}{24}$ of an inch in breadth. (For comparative thickness of the various bands see table.) For lateral incisor teeth especially bands should be very narrow and as thin as paper. To prevent them from slipping down upon the gum, small ears should always be made upon the bands, as shown in Figs. 36 and 43, which are bent into a sulcus in the grinding surface of the tooth. The same proportions mentioned in regard to banding material should be adopted in the box-wrench, Figs. 40 and 41. Every surplus or unnecessary portion of the band or box should be ground or filed away in order to reduce it to the minimum size,—depending upon the tooth or teeth to which the appliance is to be fitted.

FIG. 37.



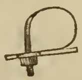
Retaining clamp.

FIG. 38.



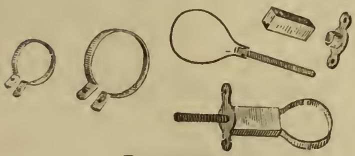
Anchor clamp.

FIG. 39.



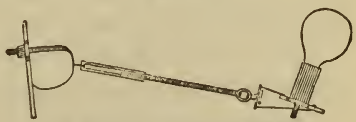
Anchor or retainer.

FIG. 40.



Box-wrench.

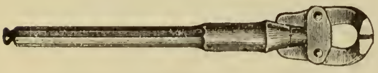
FIG. 41.



Box-wrench and swivel-jackscrew.

Screws and Bolts.—For screws round wire may be used, but I generally use the square wire drawn out to any requisite size of round wire by means of a draw-plate. Having the wire drawn out to the desired size, it is threaded (screw-cut by means of an ordinary screw-plate). I seldom find it necessary to use more than THREE SIZES OF SCREWS,—No. 15½, 18½, 20½ (gold-plate gauge), and cut to any suitable length for use, generally from ½ to 1½ inches.

FIG. 42.



Hand vise.

The cut (Fig. 42), illustrates a jeweler's hand-vise, which has been found more convenient in the manufacture of the various screws and nuts than any other instrument of its kind which I have seen,* because it has no thumb-screw in the way.

Screw-threads should vary in size to suit different cases. Some need to be stronger than others; screws for passing between teeth do not require much strength, and should be very small (about 144 threads to the inch). Bolts that are used in the construction of strap clamp-binders (Figs. 12 and 13, DENTAL COSMOS, March, 1878) have about 88 threads to the inch. For draw-bolts to be used *outside* of the arch, as shown in Fig. 6, DENTAL COSMOS, January, 1878, they should be stronger, hence larger in some cases, with about 70 threads to the inch; but this size is only necessary in stubborn cases. For bolts inside of the arch (Figs. 7 and 10, DENTAL COSMOS, February and March, 1878), I generally use smaller sizes, about 88 threads to the inch. Ordinary jackscrews, such as are illustrated in the DENTAL COSMOS for June, 1878 (very strong), have about 48 threads to the inch, and swivel-jacks,. 70 threads to the inch.

Although all screws may be made of gold, it is often well to use steel. The remainder of the fixtures, if any, however, may be made of other metals. To prevent oxidation in the mouth they may be nickel-plated, or gilded, or the same result may be secured by placing a small bit of zinc in a little hole made in some part of the apparatus, as suggested by Dr. Dwinelle, of New York. I do not often find it necessary, however, to do any of these things. Bolt-heads are made of small nuts soldered in place on the screw-cut wire, generally about ⅛ of an inch from the end, which is filed square to fit a key. Such nuts need not necessarily be threaded.

Nuts.—Although the combination of platinum and iridium is excellent, the nuts may be made from square gold wire cut in blocks, or scraps of gold may be melted into globules on a piece of charcoal, and afterwards flattened by a hammer, filed to the required thickness, drilled, and, when necessary for loose nuts, threaded by a tap corresponding in size with the screw, after which the nuts are shaped to fit a key. I find the square nut, rounded at the top to prevent irritation, to be the most useful.

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* Manufactured by Lowell Wrench Company, Worcester, Mass. Sold by S. S White.

The proper shape may be given to nuts by a file or by a pair of die forceps. I generally use one size of loose nuts $\frac{1}{16}$ of an inch cube, and two sizes of stationary nuts, $\frac{2}{32}$, $\frac{3}{32}$ of an inch cube, or a little more in length if there is any danger of destruction of the thread. Circumstances should dictate the proper sizes for nuts. As the failure of screws is generally due to the destruction of the threads, an increase of their number through an increase in the depth of the nut will accomplish the same object as a larger screw.

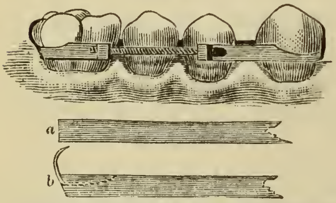
Adaptation of Fixtures.—There is no point which should be kept more steadily in view in the construction of regulating apparatus than accuracy of fit to the various parts of the teeth, especially those points where the *pinch* is most needed. Even after the fixture has been made as accurate as possible, it will probably need more or less alteration in some of its bearings before it is firmly secured in the mouth. Indeed, the first adjustment of the fixture is apt to require considerable patience; but this once accomplished, the main part of the trouble of regulating is over, and the after-work is generally very simple. I make and apply an apparatus; hand the patient the key; and let him do most of the regulating. This is what I call "regulation of teeth made easy."

To prevent irritation all sharp points of the fixtures should be rounded or otherwise removed. Adaptation of the apparatus to the teeth consists chiefly in making the parts, bands, etc., passing around the teeth of such size and shape that they will hug firmly, and with such relation to the surface-plane that they will not slip off. If the teeth are conical or are in a leaning posture, so that a firm hold on them is not practicable, the difficulty may be overcome by the use of a file or corundum wheel. Sometimes a small screw set in the side of a tooth, or a pit drilled into it, in which to secure a pin or hook, is useful. These pits may be filled subsequently like any ordinary cavity, thus preventing material injury to the tooth. While, however, the prudent use of a file or disk to form a slight groove or hollow at some point about a molar, cuspid, or incisor, is allowable their use cannot often be permitted for bicuspid teeth, and in no case except at points which may afterwards be easily kept clean by the toothbrush, pick, or thread.

The crowns of molar teeth may sometimes be hollowed out on their approximal surfaces; but it should be done cautiously, to avoid danger of decay. A better point generally is on the approximo-lingual or approximo-buccal line of molars, and the approximo-lingual line of incisors. When small bolts are required to be placed between molar or bicuspid teeth, they may generally be forced with ease through the triangular-shaped space at the necks below the point of contact.

In regard to the shape of those parts of the fixtures which serve as anchor-bands, having secured "bed-places" for them, it is necessary to shape the apparatus so as to fit into them as snugly as possible. For illustration, suppose we wish to use an ordinary long strap-clamp band for the purpose of drawing posteriorly a cuspid tooth by using the first molar for anchorage (Fig. 43). Instead of having the band made like a ring cut from a straight tube (*a*) it should flare, in order to bite at the margin. This form may be easily given to the band by hammering its upper margin, or the same point may be attained by simply bending the bite margin of the band inwardly, or soldering to it a little shoulder (*b*). Though other parts of the band may be wider, the portion which bears upon the tooth in passing around it should not often exceed $\frac{3}{32}$ of an inch in width, and generally $\frac{2}{32}$ of an inch is better. It should be, as before said, very thin. On account of this thinness, the narrow portion should not extend much beyond the bearings, and not alongside of the teeth next the tongue, cheek, or lip, as it is apt to twist when turning the screw with the key. It is generally well to have the main portion of the band about $\frac{1}{8}$ of an inch wide, so that by resting against the side of the tooth or teeth, it will prevent twisting. Should it exhibit this tendency, it should be held fast with forceps while turning the bolt. The notion that $\frac{3}{32}$ or $\frac{2}{32}$ of an inch will not be strong enough is an error.

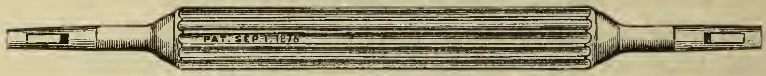
FIG. 43.



Drawing cuspid into position. Formation of bands.

Keys should, of course, be of a size to suit the case in hand. While some call for a curved key or wrench, or even a right-angle one, most cases need straight ones. Of this variety, the "jeweler's bench key" (Fig. 44)* is cheap and convenient in most cases. There are, however, cases where a long slim shank key is indispensable. Several varieties are illustrated in the cut, Fig. 45. When not convenient to purchase them, they may be made by (silver) soldering a handle into the side or end of a watch or music-box key; wrenches may be made by forging and filing. I will illustrate the principal points by a dia-

FIG. 44.



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* Keys of this sort are manufactured in sets of six, especially for this purpose, by Kendrick & Davis, Lebanon, N. H. Sold by S. S. White.

gram of an apparatus which has proved successful in several instances.

TABLE OF DIMENSIONS (GOLD PLATE GAUGE), AMERICAN STANDARD.

SIZE OF SCREWS.	NUMBER OF THREADS TO THE INCH.	SIZE OF NUTS TO CORRESPOND.
No. 20½...........................	About 144	$\frac{2}{32}$ to $\frac{3}{32}$ of an inch cube.
" 18½...........................	" 88	$\frac{2}{32}$ to $\frac{3}{32}$ " " " "
" 15½...........................	" 70	$\frac{2}{32}$ " " " "
Jacks of the shops 14½..........	" 48	Jam-nuts to suit circumstances.

ANCHOR-BANDS.

	THICKNESS.	BREADTH.
For molar teeth....................	No. 31–32	About $\frac{2}{32}$ to $\frac{4}{32}$ of an inch.
" bicuspids	" 35–36	" $\frac{1}{32}$ to $\frac{2}{32}$ " " "
" cuspids and upper central incisors......................	" 35–36	" $\frac{2}{32}$ to $\frac{3}{32}$ " " "
" upper lateral and lower incisors	" 36	" $\frac{1}{32}$ to $\frac{2}{32}$ " " "
" retaining bands..............	" 36 or less	" $\frac{1}{24}$ or less " " "

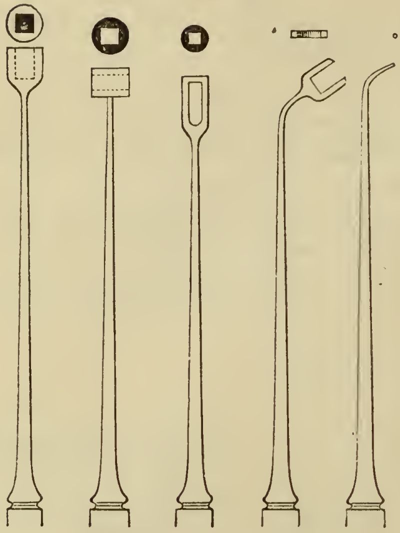
ANCHOR-BARS.

For molar teeth	No. 22–23	About $\frac{3}{32}$ to $\frac{4}{32}$ of an inch.
" bicuspids.......................	" 34–35	" $\frac{2}{32}$ to $\frac{3}{32}$ " " "
" draught-bands.................	" 36–31	" $\frac{}{32}$ to $\frac{4}{32}$ " " " "

Fig. 46 represents a fixture drawing into position a right upper cuspid from the left anterior position. The apparatus consists of a strap band cut narrow at the bearings, with ears, to prevent it from slipping down on to the gum. This strap-anchor band is placed around the molar and bicuspid teeth and tightened by means of a bolt outside the arch; a small screw, for illustration, is also set in the molar, to prevent the anchor-band from slipping off.

On the lingual portion of the band is soldered a threaded nut, through which passes a bolt, which also passes through a smooth-bored nut soldered to one end of a thin strip of plate, which is connected at the other extremity with a thin ring, which fits around the tooth to be moved. In order to prevent the ring from slipping off of such a conical crown, often only half erupted, a small point of gold wire should be soldered to the inside of the ring, as shown, which should enter a small pit drilled into the tooth, or into a cavity made by decay, if any there be, in which case it is well to first fill the cavity with gutta-percha in order to prevent further decay.

Fig. 45.

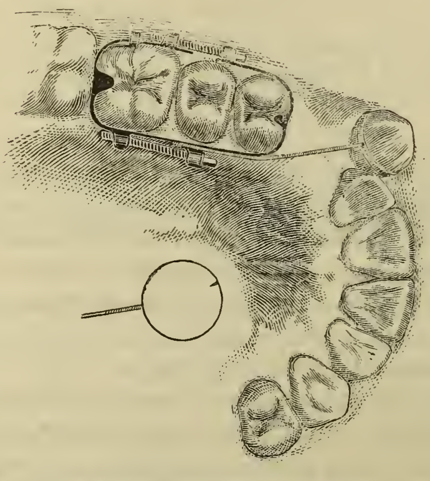


Keys, wrenches, and lever.

Having secured the anchor portion of the apparatus in position, enter first the pin point of the cuspid ring into the pit in the cuspid tooth, and then force the opposite side of the ring over the tooth, and hold it in position by means of a bolt passed through the smooth nut securing it into the screw-cut nut fixed to the anchor-band. Having the apparatus firmly in position upon the teeth, the cuspid is drawn into place by the tightening of the bolt.

The patient should be shown how the fixture is intended to be worked, the use of the keys, and instructed to tighten the nuts and bolts as much as possible, without causing pain, every morning and evening, and to call at the office occasionally. As a rule, it is well to watch the case for two or three days, in order to be sure the fixture is operating properly; but afterwards, in many instances, it may not be necessary to examine it oftener than once a week, or even at longer intervals, depending upon circumstances.

Fig. 46.



Drawing a right upper cuspid into position.

(To be continued.)

TISSUES.

BY MARSHALL H. WEBB, D.D.S., LANCASTER, PA.

(Read before the Pennsylvania State Dental Society, July 31st, 1878.)

The following paper is intended to be a succinct statement or summary of the results of recent investigations, discoveries, and opinions of histologists who have devoted time and thought to observations of the development of dental and other tissues.

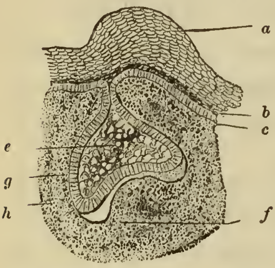
The term tissue, derived from the Latin *texere*, signifies "the texture or grouping of anatomical elements of which any part of the body is composed." The elements of tissues are corpuscles (embryonal, protoplasmic, or colloidal bodies); the elements of these bodies, granules; the elements of granules, molecules; and the elements of molecules, atoms. Hence, by the aggregation of atoms in compliance with the affinity or affinities of each, when awakened and engaged, molecules are formed; in obedience to a like law granular arrangement of molecules is brought about; and then the constructors and elements of tissue, corpuscles, are constituted. These bodies, formerly so-called cells, are properly named according to the type of tissue which they build. In nerve, bone, and dental tissue, for instance, they are called ganglionic elements, corpuscles or osteoblasts, and odontoblasts—the enamel elements and dentinal elements.

A thoroughly accurate classification of the tissues can be founded only on the course of development of the successive series of elements. This course of development is not yet accurately established throughout, yet the three germinal plates (or embryonal layers), epiblast, mesoblast, and hypoblast, might be employed as a basis of arrangement as follows:

1. Tissues of simple corpuscles, with fluid intermediate substance—blood, lymph, and chyle.
2. Tissues of simple colloid bodies, with scanty, firm, structureless intermediate substance—epithelium, hair, and nails; hair made up of a succession of epithelial bodies; nails made up of hairs cemented together.
3. Tissues of simple or metamorphosed corpuscles, with partly intermediate substance—connective-tissue group: cartilage, gelatinous tissue and reticular connective substance, fat tissue, connective tissue, bone tissue, and dentinal tissue.
4. Tissues of metamorphosed, unfused bodies, with scanty, uncalcified tracts of living matter—enamel tissue, lens tissue, and muscular tissue.
5. Compound tissues—vessels, glandular tissue, and nerve tissue.

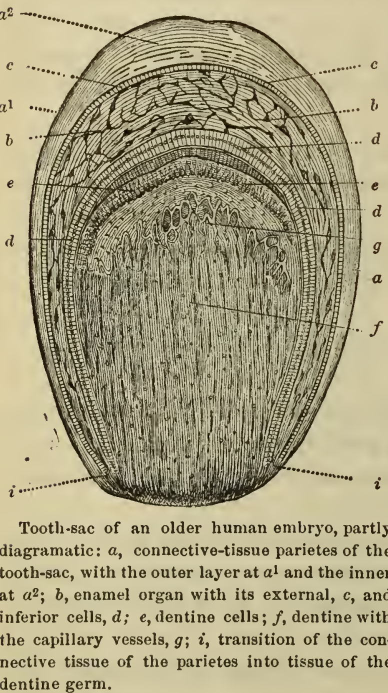
Of these tissues we are more particularly interested in those of the dental organs. The tissues of a dental organ are the pulp, dentine, enamel, and cementum. The two germinal plates which "participate in the production of these structures are the corneous layer and the middle germinal layer. The former produces the enamel, and the latter the pulp, dentine, and cement. On the free borders of the embryonic jaw appears at first a mound-like thickening of the pavement epithelium (Fig. 1, *a*.). It presses downwards into the soft substance of the maxillary tissue as a vertical, elongated ridge. The former has been named the tooth-papilla, the latter the enamel germ. From place to place, springing up from the depths of the jaw, convex papillar structures—the so-called tooth-germs, *f*—grow towards the enamel germ. Here and there, increasing in diameter, they press in the under surface of the enamel germ, giving it the form of a cap or bell, called the enamel organ, *e*. Leaving the intermediate forms aside, let us pass at a bound to a later period. Here (Fig. 2) the enamel organ *b* has long since become separated by constriction from its point of origin, the epithelium of the jaw, and also thrown off the lateral bridge connecting it with the ridge of the enamel germ. It is covered on the upper convex and inferior concave surfaces with cylindrical epithelial cells, *c*, *d*. In the interior, *b*, we find gelatinous tissue; below, *f*, we perceive the thick tooth-germ, the progressing tooth-crown. Both are inclosed within a connective-tissue capsule *a*, the so-called tooth-sac, with external, a^1, and internal, a^2, layers. The sac and tooth-germ finally become continuous with each other below. The tooth-germ bears on its surface the layer of odontoblasts, *e*. From them is produced the

Fig. 1 (Fig. 70, Frey).



Tooth formation of a hog's embryo: *a*, epithelial mound; *b*, younger cell layer; *c*, the lowermost; *e*, enamel organ; *f*, tooth-germ; *g*, inner, and *h*, outer layer of the progressing tooth-sac.

Fig. 2 (Fig. 71, Frey).



Tooth-sac of an older human embryo, partly diagramatic: *a*, connective-tissue parietes of the tooth-sac, with the outer layer at a^1 and the inner at a^2; *b*, enamel organ with its external, *c*, and inferior cells, *d*; *e*, dentine cells; *f*, dentine with the capillary vessels, *g*; *i*, transition of the connective tissue of the parietes into tissue of the dentine germ.

first thin cortical layer of the dentine. Layer on layer is subsequently formed over the longitudinally-growing tooth-germ. By this growth it finally develops the neck and the root; its soft, vascular tissue, being more and more retarded in its further development, becomes the pulp. From the epithelium at the concave surface of the enamel organ occurs the formation of the enamel prisms (below *d*), whether these represent calcified portions of the cell-body or secreted cell substances. The tooth, growing up, destroys (uses) the enamel organ at last, and makes its eruption. Its cement may originate from the lower portion of the tooth-sac."

The development of the teeth has been succinctly stated as follows: "The first apparent change is called the granular stage, and constitutes, as its name implies, an accumulation of granules, that in process of time becomes the secondary stage, called the papillary, which merges into the third stage, denominated the follicular. When the papules that constitute the sides of the follicle have increased sufficiently to unite and close the mouth of the follicle by fusing together, we have the saccular stage, inclosing the germ of the tooth, called the tooth-pulp, consisting of two planes of granular bodies destined to calcification, according to the law of their production, as demanded by the use to which they are assigned. The enamel elements calcify immediately against the first stratum of dentinal elements, and a process of hardening proceeds in the enamel elements, toward the periphery of the pulp, until complete. The dentinal bodies calcify toward the center of the pulp until the series of these are exhausted by calcification, and then we say that the tooth is fully developed, leaving now the pulp in the pulp-chamber. The cementum is produced in like manner by characteristic elements, calcifying from the zonal or inter-globular layer toward the periphery."

"In the center of a fully-developed tooth is a long, narrow chamber, corresponding to the whole of the organ, simple or multiple in form, which has a free opening at the apex of the root," through which a nerve and capillary vessels pass. This chamber "is filled with a soft connective tissue, rich in vessels and nerves." This is the pulp, and it should always be called such,—never the nerve. The dentine holds a greater quantity of lime-salts than the osteoid or bone tissue. It is permeated by extraordinarily numerous canaliculi, 0.0011 to 0.0023 mm. in diameter. "Their course is, on the whole, regular, and they are, in general, perpendicular to the surface of the pulp-cavity." The dentinal canaliculi open into the pulp-chamber, and this cavity may be very well compared to a Haversian canal of the bone, into which the canaliculi open.

Since lime-salts are melted out in territories at the end of the third day of acute inflammation of compact bone, and but small islands of former compact bone and large medullary spaces, crowded with medullary elements and blood-corpuscles, remain as the broken-down bone on the eighth day of acute osteitis, and other changes take place in the same tissue, it may be found that dental caries is partly due to a condition of inflammation.

The dentine from the neck to the apex of a tooth is covered with a tissue called the cementum. The cementum increases in thickness toward the end of the root, and throughout this tissue we find lacunæ and canaliculi. "At the margin of the cement covering and dentine numerous spaces occur, the so-called inter-globular spaces," and these are filled with protoplasmic elements. The surface of cementum is covered by connective tissue, which has been named the "root membrane," "periosteum," and "pericementum,"—which latter is certainly correct, for if the membrane that covers bone be properly named periosteum, then that which covers cementum should be known as pericementum.

If a section of cementum of the root of a human tooth be prepared and stained with chloride of gold (half of one per cent.), and examined under a power of five hundred diameters, nucleated corpuscles, with delicate offshoots in all directions, are visible. Indistinct lamellæ are also seen. About two-thirds of the number of the offshoots from the corpuscles throughout the cementum run toward the dentine, and the protoplasmic strings from these corpuscles, through the offshoots referred to, connect with those in the dentinal canaliculi.

The crown of a tooth is covered with enamel, the hardest tissue of the body. The organic form-determining basis amounts to only about two per cent. This tissue, which is a calcified epithelial production, consists of long, closely-crowded, polyhedral bodies,—the so-called enamel rods, prisms, or columns. "Transverse polished sections of the enamel show a delicate hexagonal mosaic. The surface of the enamel is covered by an uncommonly tough membrane." This (Nasmyth's membrane) is thought, by one of our best observers, to be made up of connective-tissue corpuscles, and by another to be a covering of flat epithelia.*

"Membranes are made up of connective-tissue fibers, and they are not capable of nourishing tissue. No membrane nourishes any tissue.

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* Since this paper was written an excellent article by Dr. C. F. W. Bödecker, entitled "The Distribution of Living Matter in Human Dentine, Cement, and Enamel," has appeared in the DENTAL COSMOS for November and December, 1878, and January, 1879.

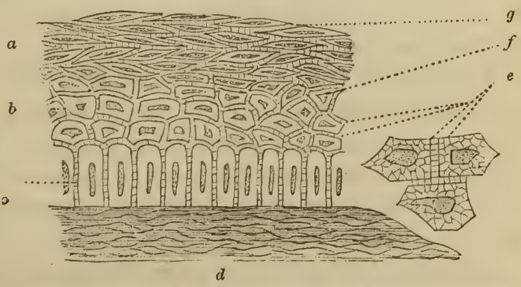
It is the blood-vessels that bring the material and nourishment there. In the old physiologies, every one thought the periosteum was the bone-nourisher. It only stands as statical tissue to hold the vessels, that they may bring pabulum to the part."

If the vitality of the pulp be lost, and the dentine and enamel be thus made non-vital tissues, the cementum is not therefore devitalized; the whole organ is not "dead;" protoplasm is still furnished to the elements of the cementum, and circulation through the vessels held to the parts by the pericementum is as free, and appropriation of pabulum takes place as before the death of the pulp-tissue. We sometimes meet with cases, however, where, through chronic abscess or necrosis, the cementum loses its vitality, and then we may properly speak of the organ as dead or devitalized.

Enamel is considered to be calcified epithelium, although it is questioned by some whether enamel is formed from epithelial bodies.

The word epithelium, derived from the Greek (ἐπι) *epi*, *upon*, and (θηλη) *thele*, the *nipple*, conveys a restricted meaning, though the term has been applied more particularly to the bodies upon the papillæ of the true skin. Dr. Atkinson considers the term as applicable "throughout the whole range of organized bodies in which these special tissual elements make their advent, fulfill their mission, and are shed in the production of the various secretions and excretions, and when not thus used desquamate to give place to their lineal successors, in order that secretion and excretion be normally maintained."

Fig. 3.



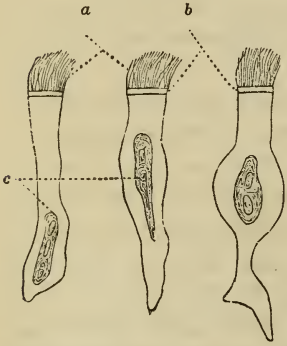
Human skin of back, vertical section (magnified 500 diameters): *a*, flat, *b*, cuboidal, and *c*, columnar epithelial bodies; *d*, derma formed by connective tissue, throughout which should be shown embryonal corpuscles; *e*, fine thorns (protoplasmic strings) traversing the cement-substance and the whole of the epithelial body; *f*, nuclei; *g*, epidermis.

There are three varieties of epithelium: flat or pavement, Fig. 3, *a*; cuboidal, *b*; and columnar or cylindrical, *c*; all with well-marked nuclei, *f*. Fibrillæ do not penetrate the cement-substance between the flattened epithelial bodies; hence sensation is not recognized till the cuboidal epithelium is reached. To epithelium belong the offices of secretion and excretion. Mucus is secreted by the epithelium which lines the oral cavity, and special secretions arise from the epithelium of the submaxillary, sublingual, and parotid glands. Epithelium covers all parts and lines all cavities in connection with the air, such as the surface of the body, the auditory and visual tracts, the respiratory tract, intestinal canal, and genito-urinary tract.

Endothelium lines closed cavities: the cavity of the skull; cavities in the brain; the spinal cord; cavities of the chest, pericardium, abdomen; all articulations; all blood-vessels, including the heart; and all lymphatics.

Some of the columnar or cylindrical epithelial bodies are endowed with cilia or vibratile prolongations, Fig. 4, *a*. These bodies are found in the deeper portions of mucous cavities, such as the stomach, nares, bronchi, and sexual organs. There are protoplasmic strings throughout and connecting each epithelial body, Fig. 3, *e*, which body is the analogue of an amœba. The cilia of the ciliated epithelial bodies are but protruding protoplasmic strings. These fine cilia are analogous to "neurine or nerve-aura, in which dynamic and psychic currents flow with least resistance. . . . Ciliated epithelium is the highest form of development of epithelial bodies. . . . The spermatozoids are but free cilia,—whips, lashes, vibrioles,—shed as products of epithelial corpuscles from the inner walls of the 'tubuli semeniferi,' the bursting of whose periphery sets them free to seek their mutual saturation in bonds contained in bodies within the Graafian vesicles, which produces the fruitage of the body as a whole in a true germ or vivified ovum, the future enfoldings and duplications of the periphery of which evolves all the differentiations of systemic development."*

Fig. 4.



Ciliated epithelium of human nasal cavity: *a*, fine cilia; *b*, seam of cement substance; *c*, nuclei. (Magnified 500 diameters.)

The class of bodies denominated amœbæ presents us with a variety of forms, from the simplest to the most complicated: 1. A simple lump or a portion of protoplasm or jelly. 2. A body with vacuoles scattered through its interior. These are non-nucleated amœbæ. 3. Nucleated amœbæ, including mono-, di-, tri-, quadri-, and poly-nucleated bodies. An amœba is composed of protoplasm in which is a network of living matter throughout. From an amœba to man all the epithelial or other bodies are connected by protoplasmic strings —a network of living matter. There is a continuous layer of protoplasm both over the amœbæ and the system and every part thereof.

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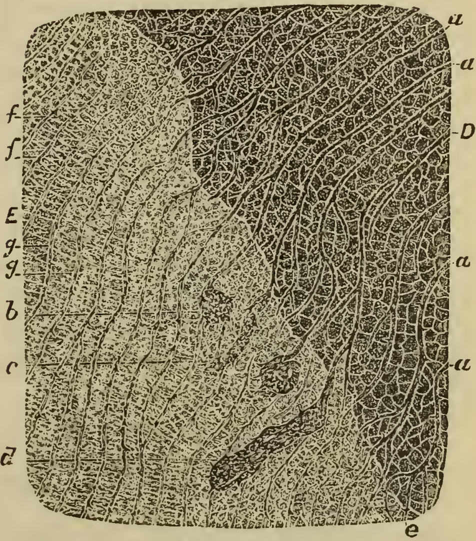
* Dr. W. H. Atkinson.

Max Schultze was the first to describe (in 1864) the delicate "thorns" which pierce the cement-substance between epithelial bodies and connect one of these bodies with another, Fig. 3, *e*. Prof. Heitzmann has since discovered that Max Schultze's thorns are protoplasmic strings, and that they are continuous with the network of living matter in the epithelial body, Fig. 3, *e*. Prof. Heitzmann attributes the movement of the cilia of the ciliated epithelium to the constant action of the protoplasmic strings — the network of living matter—within the epithelial body, and puts forth this query: "What makes this action? Electricity, soul, or what?" There must be a power which awakens the affinities of atoms and governs the type and career of bodies formed by their aggregations.

FIG. 5.

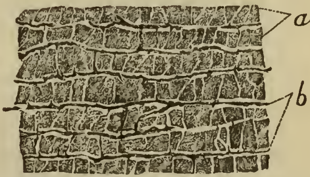


Union of dentine with enamel: D, dentine; E, enamel; *a*,*a*, dentinal fibers; *b*, *c*, and *d*, protoplasmic bodies within the granular layer of the enamel near the dentine; *e*, boundary line between the dentine and enamel; *f*, enamel fibers; *g*, enamel (Tomes's) fibers connecting with those of the dentine, direct. (Magnified 1200 diameters.)

A plastidule (which is a molecule of living matter), the chemists say, contains, carbon, 50; oxygen, 21 to 23; nitrogen, 13 to 15; hydrogen, 6 to 7; and sulphur, 1 to 2 parts.

The network of living matter is visible in all protoplasmic bodies. In specimens of dentine and enamel prepared by a pupil of Prof. Heitzmann, Dr. Bödecker, of New York, Tomes' fibers (protoplasmic strings) could be distinctly seen within the dentinal canaliculi, Fig. 5, *a*, and fine lines,—network of living matter,—could also be seen connecting the fiber of one canaliculus with those of others. In Dr. Bödecker's specimens here illustrated enamel fibers are clearly seen.* Prof. Heitzmann compares

FIG. 6.



Longitudinal section of enamel: *a*, basis-substance of the enamel (enamel prisms); *b*, enamel fibers. (Magnified 1200 diameters.)

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* Since Dr. Bödecker's articles were written wherein he stated that he had seen numerous fine thorns of the enamel fibers directed towards the light interrup-

these fibers and lines to the network of living matter in common bone tissue, and says that the pulp-chamber is simply a Haversian canal, and the living matter reminds us again of the amœbæ. The ganglionic elements—unipolar, bipolar, tripolar, quadripolar, and multipolar elements—have each and all a network of living matter, and "these elements probably multiply with advancing intelligence." Prof. Heitzmann considers that the living matter of the nerves is continuous with the network throughout protoplasm, and they are one and the same through the entire system; indeed, as Dr. Atkinson has well said, "The primal impulse of nature may be traced from the almost immutable enamel up through more mutable, because more complicate, forms of matter, solid, liquid, gaseous, and proteinaceous, till it reaches the summit of the scale in the human brain, producing there the divinest and most evanescent association known to the elements of tissues as such."

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson, M.D.

Resection of inferior dental nerve.—Our first case to-day is that of a patient in my private practice who comes to me from New York, accompanied by his physician, with the intention of having the nerve removed from the lower jaw. The disease, as you will conclude, is that of neuralgia. The cause of this neuralgia, as inferred both by the patient's medical adviser and myself, exists in an irritant associated with the maxillary canal; such a diagnosis being led to by the history of the trouble.

As already in our course we have employed the time of four lectures in studying this subject of neuralgia, I propose to-day confining my remarks entirely to the case before us.

The gentleman who, for our benefit, is kind enough to allow of the proposed operation being done in your presence, has been a sufferer from facial neuralgia for the past six years. During this period his almost continuous paroxsyms of pain have denied him all social intercourse; indeed, as he tells me, he has not found himself able to go to church in all this time over half a dozen times. To move his jaws is to excite pain; consequently, as you will conclude, he has grown into a state of taciturnity.

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tions within the rods, fine lines of living matter have been seen in these same light interruptions, and connecting the fibers.

The trouble began by the exposure of a tooth-pulp. Following pulpitis was periodontitis. Succeeding this last is the tic-douloureux. The pain, while found over the tract of the trigeminus at large, presents itself as having its seat in the lower jaw. In this seat it is that the paroxsyms always begin. Along the line of this bone is to be recognized a continuous tenderness. In this situation is to be seen always evidence of undue vascular excitement.

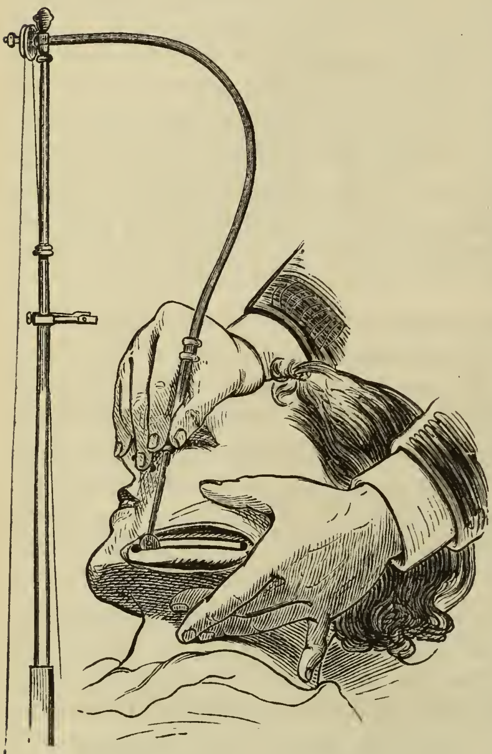
The conclusion arrived at in the case we consider is, that in the maxillary canal exists some source of irritation to the nerve upon which the neuralgia depends. What the exact lesion may turn out to be we will not commit ourselves by attempting to define; the nerve itself may be diseased; an inflammatory exudate may press upon and worry it; there may possibly turn out to be a foreign growth developing within the canal.

With the assistance of the gentleman's physician and my able clinical helpmates, Doctors Cryer and Dorr, I propose to cut down upon the inferior maxillary nerve and remove it. The particular operation to be practiced is one designed by myself, and I venture to assert that it is one which requires only to be known to supersede every other yet employed. The merits of this operation are simplicity as to performance, full and free exposure of the nerve, freedom from hemorrhage, avoidance of observable scar, and absence of trouble in the after-treatment.

Having the patient seated in the dental chair, with the body well thrown back,—a position that answers the purposes of the operator very well,—we proceed to place him under the influence of the anæsthetic. . . . He is now thoroughly under the influence of the ether we have given to him. . . . The first step in the operation is to uncover the external face of the body of the maxilla. To do this I draw up the tissues from below the jaw until they rest upon the bone. Next I sink the point of the knife through the soft structure until it strikes the bone. Observe, if you please, that the heel of the blade is in front of the facial artery, and consequently that, as I make this long cut forward, I run no risk of cutting that vessel. The cut completed I now introduce this retractor, and by its aid pull the artery backward. Next two other retractors are used, separating and holding apart the lips of the wound. . . . A succeeding step is the removal of a strip of periosteum corresponding with the breadth of the maxillary canal. To accomplish this I use the common rhaspatory, which, as you see, is here associated with the handle of the scalpel . . . Now I am ready for a succeeding step, which is the removal of the roof of the canal. To accomplish this I use a circular saw revolved by the engine. First, I find a starting-place by freely exposing the anterior mental foramen. Now I may go backward as far as I please. (The saw-cuts, as well as the general exposure, are understood through the accompanying diagram.)

In this particular instance I am sorry to have to say that the engine lacks power to allow of a rapid performance of the operation; the cord is not tight enough and the bone is uncommonly dense. An oversight is not, however, always a bad thing; the present one suggests the showing of a different manner of getting away this roof. The manner is this. (The removal of the roof of bone was completed by using a delicate chisel and mallet.)

Fig. 1.



Observe now how complete the exposure. Upon this bent probe I lift out of the canal the vessels it contains. This is the nerve; you who are near will remark that it is quite shriveled. The dental artery—this is it—is really nothing but a cord. Observe what I here lift up from the posterior part of the canal. There evidently has been an inflammatory effusion, and this shreddy tangle is the result. I assert, gentlemen, that never before, on the living subject, has any man here present seen a more complete exposure of these vessels. I do not hesitate to say that I am proud of the conceiving of this manner of operating. It will not be long before this will be the only manner of uncovering this nerve practiced. You who are familiar with the common modes employed will be sure to agree with me.

You have heard all of you of nerve-stretching for the cure of neuralgia. How satisfactorily can we practice it here! See, I cut the nerve at the anterior foramen. Now I hold the end between my fingers; I may pull and stretch at my pleasure. Certainly stretching is an indication in the present case. It is the intention to make the second division of the nerve at the posterior foramen. This foramen, you will remember, is situated on the inner face of the ramus, just below the sigmoid notch. Here is a knife I show you that is to be likened to a hoe excavator. I introduce this instrument into the canal, and feeling for the foramen I cut off the nerve just below it within the canal. Here I hold up before you the ablated nerve. You will see by its length that this last cut has been made at the point proposed.

If in doing this operation it is thought well to cut the artery, there is not the slightest trouble in throwing ligatures about the cut ends. In this case I have not cut the vessel. It is because I have not cut it that the operation is unattended by hemorrhage. I now proceed to smooth off and round the edges of bone, and particularly do I assure myself that no particles remain lodged about the wound. Without this care a union by first intention is not to be hoped for.

To finish the operation, I bring together below the jaw the edges of the wound, and fix the parts by a few stiches of the interrupted suture. . . . Looking now upon the patient's face, you cannot say (as sight of a wound is concerned) that he has ever been touched by a knife. I think, gentlemen, you will not dispute my right to be gratified with such manner of resecting the inferior maxillary nerve.

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The patient remained in the city from Saturday until Wednesday evening, when, the wound being healed, he left for his home. No single twinge of pain was felt by him while in town. Since his departure he has not been heard from.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular meeting, November 19th, 1878.

The meeting was called to order at eight o'clock P.M., the president, Dr. Benj. Lord, in the chair.

Incidents of Practice.

Dr. Wm. Jarvie, Jr., Brooklyn, New York. At the last clinic of the Brooklyn Dental Society I saw a very peculiar case. The patient, a young lady about sixteen years of age, had cleft palate. Upon examination, a tooth, standing perpendicularly, was discovered in the left nostril, and upon its extraction (under nitrous oxide, by Dr. Chapman) proved to be dilacerated, the crown turning inwardly. The fact that the full complement of teeth was present in the mouth proved this to be a supernumerary.

Dr. Norman W. Kingsley, New York. The fact that every one of the second set of teeth was present and apparent in that mouth forms somewhat of an anomaly in cases of cleft palate, particularly when complicated with harelip, as I understand this case was. Generally in such cases one or more teeth are absent near the line of fissure, or they may not be outwardly apparent, being pointed horizontally or otherwise, and not developed on the under line. I have seen many such cases as I describe; but this, in which all the second set of teeth were developed and apparent, is certainly curious.

Dr. Jarvie. The patient was operated upon for harelip when eight days old. Perhaps in that operation some disturbance of the tooth-germs was effected, which caused the singular position of the supernumerary. The full complement of teeth was certainly in the arch, though irregularly placed; the central and lateral of the left side being turned toward one another in the depression of the alveolar ridge. That the supernumerary was independent was demonstrated by its extraction.

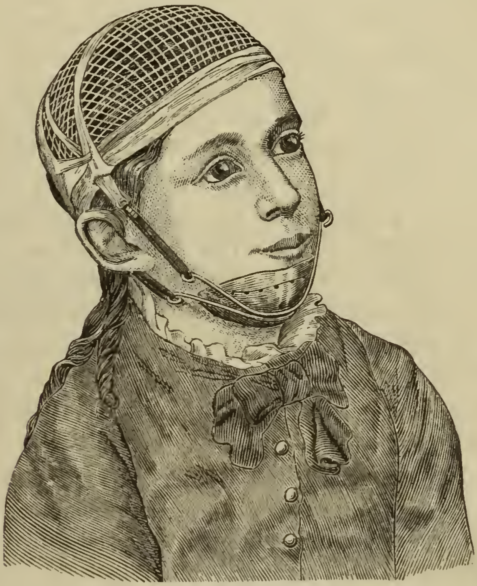
Dr. Kingsley. This case recalls to my mind one now in my hands, which forcibly illustrates defective surgical treatment of cleft palate. The patient, now twenty or twenty-one years old, was operated upon in infancy for double harelip. The operator, finding the intermaxillary bone standing as a protuberance in the fissure, and perhaps fancying he could improve upon the general surgical practice in such cases, cut the intermaxillary out instead of jamming it down into place. As this bone contains the germs of the incisor teeth, the operator thus rendered his patient incisorless, besides leaving an extensive depression which the bone should have filled.

Dr. Geo. S. Allan, of New York, then gave an account of two cases, "protrusion of lower jaw and treatment," and a case of osseous tumor, known as the "case of Dr. Hodson:"

Protrusion of Lower Jaw and Treatment.

In April last a little girl was brought to me for dental treatment only, but noticing that the lower jaw presented a very marked protrusion, I advised that it should be immediately treated with a view to the removal of what was a positive deformity, and was asked to undertake the treatment. The deformity was entirely in the under jaw, which was, as usual in such cases, of abnormal width, and projected so that the lower arch extended outside the upper throughout its whole circuit. Usually, in such cases, I direct delay, before beginning to operate, until the permanent teeth are all in place. But, after consideration, I adopted for this case a different plan. As the irregularity appertained to the jaw itself and not to the arrangement of the teeth, I decided to operate upon the jaw alone, and to bring about a correct articulation of the teeth as a sequence. My first plan was to construct two dental splints or plates of rubber, one each for the upper and lower jaws, having a protuberance on each in the nature of an inclined plane, which would act, during closure of the jaws, to force the lower one backward. But I did not persevere in this direction, for I soon found that it would be of little use. Then, directing the child to continue wearing the upper plate, I set to work to make an apparatus that would pull the lower jaw back, keeping the upper splint alone in place. As you will see from the photograph taken at the time she was wearing this apparatus, it consists of two parts. For the lower part I made a brass plate to fit the chin, having arms with hooked ends reaching to a point just below the point of the chin. These arms were arranged in such a way that the distance between them could be altered at will by simply pressing them apart or together. The upper part consisted of a simple network going over the head and having two hooks on each side, one hook being above, and the other below the ear. When this apparatus was completed and in use, there were four ligatures of ordinary elastic rubber, pulling in such a way as to force the lower jaw almost directly backward. I relied upon the elastics attached to the lower arms to do the main work. The upper elastics were simply used to keep the mouth closed so that the lower elastics would not pull it open, the upper elastics being made just strong enough so that the child, in the natural operations of eating and talking, would not have to strain the muscles of the mouth to keep the jaw open. The work proceeded very rapidly,

Fig. 1.



much more so than I had expected, so that at the end of two months, instead of six (as I had told the mother of the child it would take), the irregularity was almost entirely cured. At about the end of the first month there came a stop, and for two weeks I could not get the jaw to move one particle, which puzzled me very much. The mother said the child wore the apparatus regularly, day and night, and she knew of no reason why the work should not go on. I had the child brought down to the office in the morning and kept her there all day watching her, and I found that when she was busy at reading or play she would push the network on the head back so that the elastics did not pull. Thus that puzzle was solved. I then directed the mother to watch her carefully, and keep the band of the network well on the forehead, and also more carefully directed the young miss herself and warned her that she would lose all that had been done if she was not more careful in the future. After this the work went on steadily to completion. In a little over two months the under teeth were completely inside of the upper. The cast I hold in my hand represents the condition of the teeth when I commenced operations, and this one shows the condition of the teeth at the present time. In my absence during the summer the child wore the elastics only during the night, and on my return I found that the jaw had pushed out a very little, not enough to throw the upper teeth within the lower teeth as formerly, but so that the left upper incisor was just touching the tip of the lower one. I had the apparatus re-applied, and this slight relapse soon disappeared. I see no reason why, in all such cases, either this or similar methods of procedure should not be adopted. If taken at this age, or even when the child is older, I cannot see why success should not attend the efforts of the dentist. I was puzzled at first to understand how I had obtained so great an amount of recession in the lower jaw, but on carefully examining the skull and position of the parts at the child's age, the proper solution of the problem soon presented itself. The jaw at that period of life is completely developed and hardened. When a child is one year old the union between the two lateral halves of the jaw takes place, and at eight years the jaw is solid. Consequently any efforts that may be made will not affect the jaw-bone itself. The only way in which the change can be made is by pushing back the condyles of the jaw into the glenoid cavity. Allow me just here to show you the skull of a child about five years of age. The articulation between the glenoid cavity and the condyle is peculiar, in that there is a double synovial membrane between which there is a cartilaginous bursa. This cartilage gives way and absorption takes place at the posterior side of the condyles, with filling in of the anterior, so that the whole operation consists in pushing the condyles of the lower jaw into the glenoid cavity of the temporal bone. Until the articulation has again receded by the natural protrusion of the teeth, I suppose the child will have to wear the apparatus more or less. I had it taken off to bring here this evening. I should certainly in any similar case presented hereafter, even at twelve or thirteen years of age, before attempting any other procedure, try this first and thoroughly.

Dr. S. G. Perry, New York. Is the chin-plate lined with cotton or other soft material?

Dr. Allan. I had it made with a pad between the chin and the plate; but to my astonishment the child preferred to wear it without the pad. I had the plate nickel-plated. I would say that the main difficulty which I apprehended was that inflammation might occur in the articulation. I cautioned the child and the parent frequently not to push the matter in the least; insisted that the child should be watched carefully, and the moment there was any soreness of the parts, the elastics should be taken off, or loosened in tension power very much. But to my astonishment the child, from the beginning to the end, was free from complaint of pain. The apparatus hurt her feelings and pride more than anything else. I never had a case that went on more rapidly and easily than this one.

Dr. C. A. Marvin, Brooklyn. How long will the patient have to wear that appliance?

Dr. Allan. Only until the teeth articulate perfectly, which, I suppose, will be in about a year.

Dr. Marvin. You do not look for any change in the shape of the lower jaw?

Dr. Allan. It is impossible. All the change is the moving of the articulation back in the glenoid cavity.

Dr. Francis. Would you treat a case like that in a child fourteen or fifteen years of age?

Dr. Allan. I do not know. I think I should try it. Looking at adult skulls, I find the glenoid cavity is so shallow and the condyle so large that there is room for the jaw to be moved back one-sixteenth of an inch, or more. I would not advise the process in any case over twelve years of age; but it seems to me that, up to that age, I would advise it. Dr. Northrop says he had a similar case years ago, and he carried it through successfully.

THE CASE OF DR. HODSON.

Most of those present will recollect the singular case of Dr. Hodson, which I brought before the society last spring. At that time I told you that the puzzle was solved in the finding of a little nodule attached to the edge of the alveolar process and growing down into a cavity in the root of the tooth. The case was so unusual that I did not attempt at the time to say what the nodule was, or explain how it came there; whether the nodule grew there and the cavity formed as a consequence, or whether the cavity existed first and the nodule grew in it. I can now tell you that having succeeded in making a microscopic section of the nodule, I find it a true osseous tumor. I have brought the section here, so that those present can examine it. The cavity in the root of the tooth into which the nodule grew extended nearly to the pulp-cavity; so that there could have been only a thin septum of dentine intervening. I cannot say whether the pulp would have been exposed by its removal, because it was taken out after the pulp was destroyed. The nodule was one-quarter less in diameter than the depression or cavity in the root of the tooth.

FIG. 2.

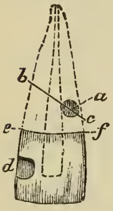
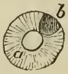


FIG. 3.



Dr. Clowes. Was it a natural cavity or a decayed one?

Dr. Allan. It was a natural one. There was no decay. Although all inflammation is now gone down, it is still as ugly-looking a tooth as it was at the time I brought it to the notice of the society. It is a question between Dr. Hodson and myself as to what shall be done with the little opening in the gum. At first we proposed to close it with a double stitch. I hesitated about doing so, and finally told the doctor I would rather he would consult some one else; for my impression was that if that opening was closed up, though it might be successful at first, the operation would ultimately prove a failure, for the reason that the little septum of gum is free, the small portion of periosteum which was there at first having disappeared. If the opening is closed, and this natural vent which the opening presents for the escape of any matter which may accumulate there be shut, the matter will have to burrow between the septum of gum and the tooth, and such a pocket would be of considerable depth, probably half an inch. I hesitated about closing it up. Also, although the thickness of the gum is not more than one-sixteenth of an inch, it is very firm and tough; and although I took two little stitches and tried to press the margins together, I found it almost an impossibility. If a stitch is finally decided on, there will have to be little cuts made at either side of the opening to allow them to come together.

Dr. N. W. Kingsley, New York. I have done substantially the same thing as Dr. Allan describes a dozen times within the past ten years. I have had three cases in the last six months of a similar character. In answer to Dr. Francis, I would say that I have done it after the patient was seventeen years of age, and have had no difficulty whatever, except that it took a little longer time. I have done it at nine years of age within six months, taking a great deal less time than with an older person. Three cases which involved a change in the articulation of the jaw were treated differently. One of them required the forcing back of the lower jaw, similarly to the case described. The second was one where it was necessary to bring the lower jaw forward. In both cases it was done by breaking up the old articulation and forming a new one. The third case was one in which the lower jaw was too full, showing a marked peculiarity in the region of the six front teeth, and the patient was over twenty years of age. I did not here attempt to force the jaw back as I would in a younger patient, but I did take out one of the central lower incisors and reduced the size of the arch, which accomplished substantially the same thing in the profile of the face.

Dr. Allan. You think my explanation of how the jaw was moved back was the right one?

Dr. Kingsley. I certainly do.

Dr. Marvin. How about the crack in Dr. Hodson's tooth?

Dr. Allan. The crown was separated from the root. The tooth is cracked. I filled it by taking a piece of wire, passing it up to the point of the root, having it pressed down in the cavity on the side, and then filling around it with osteoplastic. That holds the two parts together. They were entirely separated.

Dr. Lord. Did Dr. Allan get at the cause of the fracture?

Dr. Allan. The only suggestion I can make is that as the tooth was very much weakened by the cavity in the root, it was cracked by a very slight blow,—so slight that Dr. Hodson did not know of it at the time it was done.

Dr. Clowes. I would like to know how the pulp was destroyed?

Dr. Allan. I applied chromic acid.

Dr. Clowes. Is that where the discoloration comes from?

Dr. Allan. I am afraid it is. This case (if the discoloration did come from the use of chromic acid) is the only one out of eighteen or twenty cases in which I have had any discoloration.

Dr. Brockway. Why do you use chromic acid in preference to arsenic?

Dr. Allan. It acts kindly and I think with better effect. It destroys just enough tissue, and no more. I have not had a sufficient number of cases to unhesitatingly advise it in all cases, but I use it.

Dr. Jarvie. What do you mean by saying that it destroys just enough?

Dr. Allan. It does not leave behind at the point of the root any devitalized pulp in a decomposed condition. It kills entirely, and there is no danger in its use from necrosis. I make the application and remove all the acid before I take the rubber dam off. One reason why I have thought the discoloration might come from the blood in the tubuli is that in using chromic acid afterward the discoloration was lightened very materially. Certainly the tooth is not half as dark as before. There undoubtedly will be great discoloration if any chromic acid is left in the cavity to work for any length of time. Every bit of the chromic acid should be removed before the patient leaves the office. If left in the tooth four hours there would be discoloration; but it is of a dark green and peculiar hue which, once seen, is always recognizable, and may be readily referred to its proper source.

(To be continued.)

FIRST DISTRICT DENTAL SOCIETY.

A REGULAR meeting of the First District Dental Society was held on the 5th day of November, 1878, Dr. William H. Allen in the chair.

A paper was read by Dr. C. F. W. Bödecker on "The Distribution of Living Matter within the Human Dentine and Enamel,"* which was discussed as follows:

Dr. Atkinson. I think that this paper ought not to be permitted to pass without a few remarks by way of indorsement. Questions heretofore inexplicable are rendered explicable and understandable under the guidance of new interpretations. It is tedious for an individual not engaged in the investigations of histology to listen to the dry detail of investigations which can only be pursued by the employment of instruments that shall multiply bodies that are the ultimates of the tissues, to such a degree as to impinge upon the retina so as to be possible to the sight. I speak feelingly on this subject. I have been led through the byways of false interpretations by the assumption of teachers who had no means of knowing whereof they taught. Thanks to Carl Heitzmann, we have the key now that enables us to unlock that which has made so many shrewd minds blunder. We now know what "elements" signifies. We now know what the peculiar kind of appearances are that have heretofore been named variously by different observers, as "cells," "rods," etc., in their attempts to reveal the intimate structure of the fibers of the enamel, dentine, and cementum. By late discoveries of Professor Heitzmann and his pupils, we are enabled to understand definitely, through staining and other means that are being taught, the intimate structure of these hard tissues that have heretofore been regarded as solid bodies,—solid masses of lime-salts. But if you have listened closely to the reading of this paper you will see that it has been acknowledged that there was some sort of bond of union between the enamel-fibers, the dentinal fibers, and the fibers of the nerve in the pulp, whereby the sensation of "tooth-edge" is produced. The human mind, when it has assumed to explain anything, whatever it may be, stumbles again and again upon that assumption even against stronger light; even against a presentation of facts that really reveals the true state of things. How could bodies be nourished without some kind of channels capable of conveying nutrition from tissue to tissue? To me it is clear that the human body is under one autonomy, as displayed in the different tissues, and that the enamel itself is nourished and can decay. We hope to be able to prove these things clearly and satisfactorily to all before long. The subject is too profound and too complicated to be settled at once, but I rejoice at what has been presented to-night.

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* This paper was published in the DENTAL COSMOS for November and December, 1878, and January, 1879.

Always when we are learning our alphabet we learn slowly, and enunciate sometimes indistinctly. We are in that condition to-day. I value this paper so highly because we are about getting rid of misapprehension, and reaching a status where we can say that we do know what the tissues are, and hope to know what the various changes are that we call nerve-activities. When we get a thorough knowledge of the physiological action, we hope to understand the methods by which we may explain the pathological activities, by such means as may be suggested to us through the better light that is dawning upon us with regard to molecular metamorphosis.

Dr. Heitzmann. We learn from the history that we have just heard —a short abstract of the histology of the teeth—that the methods applied had a great deal to do with the misapprehensions.

Another thing we have learned is that in the histology of the teeth, as well as in other branches of science, there are really but few observers, and very few thinkers. The majority of those who have written upon the subject have rarely been observers themselves; they have merely written what others claimed to have seen. The study of history is highly interesting. It shows how each decade has had its peculiar theories. In the last century the conclusions of even such a genius as John Hunter were full of error, owing to the poor methods employed. Natural philosophy may be said to have begun in the third decade of this century, and in the fourth decade highly-important facts were developed. At that time the elder Tomes first mentions the cementum, which till then had been altogether overlooked. If we analyze the knowledge that has been gained since that time, we find that the first tissue of which a somewhat definite knowledge was gained was the dentine, and from the elder Tomes we learn something that before was not known at all,—namely, that there exist soft fibers within the teeth. The elder Tomes was not only an observer, he was a thinker also. He saw something within the canaliculi, which up to that time were only considered as bearing fluids;

he saw first the fibers, and came to the conclusion that in these fibers was located the capacity of conducting sensations, and suggested whether it would be proper to call these fibers nerves. His son is behind the father. He denies that the father ever suggested calling these fibers nerves, but it is the fact that he did, and he was very near the truth, because nowadays we know that there is no difference between the living matter in any ordinary protoplasm and the axis cylinder of the nerves; they are identical. The tissue which next claimed attention was the enamel, although the study of the enamel has not been prosecuted to any great extent. Nasmyth in 1849, if I am not mistaken, wrote of a peculiar membrane holding the enamel prisms together, and since that time all authors have given Nasmyth the honor of the suggestion by calling the uppermost layer running around the tooth, or only around the enamel, "Nasmyth's layer." From that fact, and from what I have learned from Dr. Bödecker's paper, I think they did not quite understand Nasmyth; and there are very good observers and pretty good thinkers who believe even now that what is called Nasmyth's layer runs all around the tooth; and some authors have called the cementum itself Nasmyth's layer. Nothing was easier than to suppose that Nasmyth's layer ran all around the tooth. It is of course of little consequence whether we call it Nasmyth's layer or call it, as the Germans do, "cuticle." I do not doubt that this cuticle is epithelial. I do not say that it is built up by flat epithelium alone. I have seen instances where the cement-substance has been very little marked, and a direct union of the protoplasm established, very much reminding one of the tubules in a child's kidneys; but that it is epithelial I do not doubt, inasmuch as we know that all parts of the body in open communication with the outer world are really covered with epithelium. With regard to the minute structure of the enamel very little was known indeed. Our authors just write one after another that the prisms are, as you have heard to-night, closely packed together; that there were no interstices. The interstices are very plain to be seen,—not only the interstices, but the fibers they contain. The tissue least known was the third tissue, the cementum. All authors, including our best German histologists (for instance, Wedl), considered the separate lacunæ as merely containing some basis-substance. None of them were aware of the fact that there must be living matter in the cementum just as well as in the tooth-bone. They all saw the complete resemblance between the two, but the wrong methods of examination were the cause of the mistake. They used dry teeth, and what could they have seen in dry teeth? They describe the lacunæ as black spaces. They could have seen nothing but spaces filled with air and débris. But what the lacunæ really contained was first settled by

Dr. Bödecker, who first studied the network in the bone and revealed the lacunar substance when he studied necrosis. Thus we have brought both things in agreement. You can recognize the protoplasm in the cementum. I do not doubt that this is the work of the future, which will enable us to understand numerous pathological processes which thus far have not been understood. I hope that before long Dr. Abbott will publish his paper on the pathology of caries. It is utterly impossible to understand the process of caries in the living teeth until after we have studied and understood the normal tissues of the teeth.

Dr. J. S. Latimer. May we not get some little assistance in the apprehension of this subject, in this way: suppose, for instance, we let the floor of these parlors represent the membrane which separates the enamel from the dentine; in stellate depressions on its surface we set spherical bags of lime, row after row and tier upon tier until they reach the ceiling, which may represent Nasmyth's membrane.

Now, from the outer world, we let in a fluid laden with hardening and vivifying material, which, by help of the tissue of the bags, is conveyed to every bag and its contents. We have all noticed, no doubt, the little cups of enamel lined with dentine in the mounted infantile jaws employed in the schools to illustrate the formation of the teeth and jaws. They exhibit a loose-textured and coffee-colored appearance,—the hardening process having been arrested by the death of the subject; and we have also noticed in the teeth of adults spots of the same texture and color, in which the arrestation may have been caused by one of the exanthemata, perhaps.

As for the form of the so-called enamel-fibers or prisms, the lateral pressure upon each other when in a soft state would be well illustrated by the bags of which I have spoken.

Dr. Atkinson. I want to thank Dr. Latimer for the beautiful illustration he has given us, and to say a few words as to the limiting membrane. As to the sacks containing the lime-salts: whether or not these sacks begin at the bottom, the limit is this disputed tissue that has been called Nasmyth's membrane. The great difficulty in understanding this has been that Dr. Latimer's method has not been employed; observers have not examined sections of jaws where teeth were being developed. In every tooth that is the successor of a temporary tooth there is beyond the limiting membrane a cell—another room—that is made up of bony structure, so that it is completely shut off from its predecessor, the temporary tooth. Now can we not by his suggestion very clearly understand, without really knowing where the lime-salts do come from, that it is because these subsequent sacks, having begun at the bottom, which is called the enamel seat, either calcify in toto or rise up, depositing the lime as they go? And now as to the other question that he asked: The reversal of this action is going on, and the dentinal cap is being thickened by additions from its periphery towards its center until all the elements that are capable of being fully calcified under enamel in the primary way of movement go to their limit by being calcified, and thus we have primary dentine; and whatever calcification occurs after that takes up a new line of departure, some calcifying solidly without leaving dentinal fibrils in them at all, and others leaving a few remnants of uncalcified material, presenting a moss-like appearance, that we call dentinal fibrillæ.

Dr. Bödecker said in reply: The dentine starts, by what is known as the membrana eboris, inwards towards the pulp; in its embryonal condition composed of nothing but indifferent elements,—embryonal elements,—and those calcify in the same way as bone or any other connective tissue is formed.

Dr. Atkinson. We will never understand this matter until we have thoroughly investigated embryological development as referred to by the last speaker. We have three embryonal sheets that are made up of nothing in the world but this indifferent material that Dr. Bödecker has spoken of. The embryonal corpuscles that originate from what is called the blastoderm, constituting the *area opaqua*, which body is superposed upon the *area pellucida*, whence comes the increment of embryonal corpuscles.

The epiblast or upper layer and the hypoblast or under layer are separated by the growth of embryonal corpuscles between them, denominated the mesoblast, thus completing the three embryonal sheets or layers. The foldings and reduplications of these three sheets give us the lay-out of the somatopleuræ and the splanchnopleuræ, or the body walls and the visceral walls composing the embryo.

An increment by growth at opposite edges of the blastoderm changes a circular disk to an ovoid form, and gives rise to the head fold and tail fold from which originate the œsophagus and rectum. A massing of embryonal corpuscles denominated proto-vertebræ constitutes the foresteps or lay-out of the bony, muscular, and nervous system. Just here I will say in regard to the question that was asked (by mistake) as to the origin of cement-corpuscles, that what has been called Nasmyth's membrane—the upper layer—is made up from the same kind of indifferent corpuscles, and when it has attained a certain degree of ripeness, and when we shall be able to discriminate that ripeness, then we shall not be such sticklers for insignificant classifications, and we shall be able to understand the changed character of indifferent bodies that are capable of being merged into each other, and be better able to agree as to what they are. Every epithelial body starts from an indifferent corpuscle, the lens of the eye not excepted.

If we consider the Malpighian layer of the skin, it is first composed of indifferent corpuscles, which if they were not pressed down would be perfectly spherical; they become elongated after the manner so beautifully illustrated, and which is proven by the section shown. Then they become pressed a little more longitudinally, then laterally, and when that pressure shoves them towards the periphery they become flattened by degrees until, on the surface, they are unmistakably epithelium, so that we have a right to say that they are really epithelial in character from the moment they cease to be embryonal corpuscles.

Adjourned.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY THEODORE F. CHUPEIN, D.D.S.

At a meeting of the association, held November 12th, 1878, Prof. Buckingham made a verbal report of some experiments he had instituted with a view of ascertaining the alloys or impurities in gold foil. The tests indicated the presence of iron, and in such quantity as led him to believe there must be some error in his manipulations. In other experiments he had detected the 1-250th of a grain of iron in a half-ounce of gold. He regretted that he had not all the appliances necessary to continue the experiments. If he had had the means of volatilizing the gold he could have told better what the impurities were, and what their proportion; or, if he had had a spectroscope, he could have observed the lines of tin, iron, or other metals present. The experiments, however, though interesting, presented no practical value, for if we can get gold foil which works well, it does not much matter whether it contains a trace of iron or of anything else. There is great difficulty, nay, almost impossibility, of getting pure gold, or, in fact, pure anything. The labored, tedious, expensive, and exhaustive experiments of Sir Humphry Davy to obtain pure water, which in the end proved futile, were instanced to prove this assertion. He referred to an able paper on "Gold," by Dr. G. V. Black, published in the Dental Cosmos, March, 1875, in which the subject was thoroughly treated. He confirms that writer's experience of the difficulty of keeping different gases, especially hydrogen, from adhering to the surface of gold and platinum. He thought the foils offered were as pure as there was any necessity for, although traces of alloy might be discovered in them. Tin is recognized as an enemy to the working property of gold, yet one manufacturer professes to alloy his gold foil with tin in exceedingly small quantities, 1 part in 1000, and he had been informed by those who used it that it worked admirably.

Dr. E. R. Pettit could not understand why it was, if all the foils were pure, that some worked so well and others so badly.

Dr. W. H. Trueman said that the difficulty might be due to the surroundings. In easy cases the gold would work well, while in protracted operations the fumes of sulphur from the rubber dam and the exhalations from the body might interfere. He commended the perusal of Dr. Black's paper on gold to all who had not read it. For himself, when performing an operation of more than ordinary difficulty, the perspiration was apt to flow freely from his hands on to the rubber dam. This exhalation and that from the sulphur in the rubber dam might interfere with the working of gold. Dr. Black believed that even the fumes from a match were enough to interfere with the working quality of gold foil. He kept two books of gold in use, and the sheet that was exposed to the air lost its adhesive quality very soon, while that which was kept covered retained this quality.

Dr. S. H. Guilford said that Dr. Black recommends that all gold before being used should be subjected to the fumes of ammonia. He referred to an operation he had seen Prof. E. T. Darby perform with needle-points—a compound filling inserted; the gold well adjusted to the walls of the cavity and well consolidated. From this he felt sure that all pure gold was cohesive.

Dr. T. F. Chupein said he had heard Dr. Pack state at a meeting of the Odontographic Society of Pennsylvania, that gold to be cohesive must be pure; that any alloy would destroy the cohesive property. He (Dr. Pack) stated that if a sheet of Abbey's non-cohesive gold be rolled into a rope loosely and applied to the flame of a spirit-lamp it would be melted, and the little globules would be of a dark or brownish color, while if the same thing be done with a sheet of cohesive gold from the same or any other manufacturer the globules would be as bright as the sheet from which they were melted. The experiments showed the presence of alloy in non-cohesive gold and its absence in cohesive.

Dr. Buckingham said: If this be so, why is it that sheets of gold leaf which is known to contain alloy will stick to each other?

Dr. Chupein replied that he thought this due more to its excessive attenuation than to any cohesive property it possessed. It would stick to almost anything.

Dr. Buckingham said he did not think tin foil could be welded cold.

Dr. Chupein had tried to weld tin foil. It could be welded cold, but with difficulty. Instruments with deep serrations must be used for the purpose. Slayton's felt foil could be welded with facility. He had received a sample of this from S. S. White, and was much pleased with it; it worked like dough, and was capable of perfect welding. He had used the ordinary serrated pluggers to work it. In one case which he had tried experimentally it had justified the claim that gold foil could be welded to it, but in another the gold failed to adhere to it. He thought more favorably of it than any tin foil he had ever used. He cut the sample up in strips one-eighth of an inch wide, and divided these again in pieces one-fourth or one-half inch in length. So used, it would not ball or choke, but could be pushed in any direction, and was entirely tractable.

AMERICAN ACADEMY OF DENTAL SCIENCE.

The eleventh annual meeting of the American Academy of Dental Science was held at the Hotel Brunswick, Boston, October 30th.

There was a very good attendance, including many eminent men of the profession. President Dr. E. G. Tucker in the chair.

Drs. G. L. Parmele, of Hartford, Conn., J. Adams Bishop, of New York, and L. Tracy Sheffield, of Paris, were elected members. Dr. Joseph E. Fisk, of Salem, Mass., was elected an honorary member.

The following gentlemen were elected to membership during the past year: Drs. G. H. Ames and F. G. Eddy, of Providence, R. I.; F. H. Rehwinkel, of Chillicothe, Ohio; and C. A. Marvin, of Brooklyn, N. Y.

Dr. Elbridge Bacon, of Portland, Maine, was elected to honorary membership.

The following officers were elected for the ensuing year:

President.—Dr. E. G. Tucker.

Vice-President.—Dr. J. L. Williams.

Recording Secretary.—Dr. E. P. Bradbury.

Corresponding Secretary.—Dr. E. N. Harris.

Treasurer.—Dr. L. D. Shepard.

Librarian.—Dr. J. T. Codman.

Board of Censors.—Drs. T. H. Chandler, W. W. Codman, and D. M. Parker.

A communication was received from the Massachusetts Dental Society, inviting the academy to meet with the other dental societies of New England in joint convention, to be held in the city of Boston, in June, 1879. The invitation was accepted.

Charles W. Eliot, LL.D., President of Harvard University, delivered the annual address before a large number of the profession present by invitation of the academy. His subject was "The Defects apparent in the American System of Dental Education."

The address was received with close attention, and at its close a vote of thanks to President Eliot, coupled with a request for permission to publish it, was unanimously passed. It will be published in full.

An essay by Dr. Henry S. Chase, of St. Louis, on "Filled Teeth as Galvanic Batteries," was read by Dr. Geo. T. Moffatt, a letter having been received by him from Dr. Chase, stating that he was unable to be present. Dr. Chase, after announcing his belief in the theory of Dr. S. B. Palmer, of New York, that every tooth having a metallic filling was a galvanic battery, proceeded to recount several experiments made by himself, which had convinced him of the truth of this theory. The conclusions arrived at were that dentos was positive to gold, gold and platinum, amalgam, tin, and lead.

Each of these metals united to dentos formed a battery, the power of which could be stated thus:

With gold, and gold and platinum	100
" amalgam	66
" tin	50
" lead	30

With Hill's stopping there is no action, and with oxychloride of zinc the tooth becomes negative and the filling positive.

In concluding, he said that the perfect filling was yet to be discovered. It must not be negative to dentos, it must not be positive to dentos, and it must be plastic.

The essay elicited considerable discussion, after which the academy adjourned, and the members with the invited guests partook of the eleventh anniversary dinner, at 5 o'clock P.M., at the Hotel Brunswick.

EDWARD N. HARRIS, *Cor. Sec.*,
No. 5 Park St., Boston.

MASSACHUSETTS DENTAL SOCIETY.

THE fourteenth annual meeting of the Massachusetts Dental Society was held at the Tremont House, Boston, on Thursday and Friday, December 12th and 13th, 1878. The following officers were elected for the ensuing year:

President.—Dr. L. D. Shepard, of Boston.
First Vice-President.—Dr. G. A. Gerry, of Lowell.
Second Vice-President.—Dr. Thomas Cogswell, of Boston.
Recording Secretary.—Dr. Dwight M. Clapp, of Boston.
Corresponding Secretary.—Dr. Thomas H. Chandler, of Boston.
Treasurer.—Dr. E. Page, of Boston.
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Executive Committee.—Drs. C. H. Osgood, of Boston; J. H. Kidder, of Lawrence; R. R. Andrews, of Cambridge; H. C. Meriam, of Salem; A. M. Dudley, of Salem.

Dwight M. Clapp, *Recording Secretary.*

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

The annual meeting of the Alumni will be held on Thursday, February 27th, at 10 A.M., in the College building, 108 N. 10th Street.

Daniel Neall McQuillen, D.D.S., *Secretary.*

ALUMNI ASSOCIATION OF THE MARYLAND DENTAL COLLEGE.

The Alumni of the Maryland Dental College of Baltimore will hold its regular annual meeting, March 7th, at 11 o'clock, in the Faculty room of the College. A grand supper will be given by the Alumni on the evening of the seventh.

H. M. Schooley, D.D.S., *Secretary,*
1113 Pennsylvania Avenue, Washington, D. C.

BALTIMORE COLLEGE OF DENTAL SURGERY.

The thirty-ninth annual commencement of the Baltimore College of Dental Surgery will be held at the Academy of Music, Baltimore, on Thursday evening, March 6th, 1879. The valedictory address will be delivered by the Rev. Dr. Alex. W. Weddell, of Richmond, Va. The Alumni and all friends of the College are cordially invited to be present.

F. J. S. Gorgas, *Dean.*

ALUMNI ASSOCIATION OF THE BALTIMORE COLLEGE OF DENTAL SURGERY.

The annual meeting of the Alumni Association of the Baltimore College of Dental Surgery will be held in the College Building, March 6th, 1879, commencing at 10 o'clock A.M. The Alumni are respectfully invited to attend without further notice.

William B. Wise, D.D.S., *Corresponding Secretary.*

ALUMNI RE-UNION OHIO COLLEGE OF DENTAL SURGERY.

The first meeting of the alumni of the Ohio Dental College will be held in Cincinnati, on Thursday, March 6th, 1879, 2 P.M.

The executive committee appointed will attend to all arrangements necessary for the success of the meeting and entertainment of those attending. It is earnestly desired that every one will respond to this call, and by his presence give assurance of continued interest in his time-honored Alma Mater.

E. G. Betty, *Secretary.*

MISSISSIPPI VALLEY DENTAL ASSOCIATION.

The thirty-fifth annual meeting of the Mississippi Valley Dental Association will take place in Dental College Hall, Cincinnati, Ohio, on the first Tuesday in March, 1879, at 10 o'clock A.M.

E. G. Betty, *Secretary.*

BIBLIOGRAPHICAL.

Elements of Dental Materia Medica and Therapeutics; with Pharmacopœia. Second Edition. By James Stocken, L.D.S., R.C.S., Eng. Philadelphia: Lindsay & Blakiston, 1878.

This little volume, which was noticed in these pages a year ago, has reached a second edition, having grown from 147 to 319 pages. The new matter includes tables of weights and measures, symbols, poisons and their antidotes, and chemical notation; additions to some of the original chapters, and notice of additional drugs and chemicals. Some of the articles noticed might well have been omitted altogether, as without special significance in a Dental Materia Medica, and most of those which have a special interest to dental practitioners might with great advantage have been more fully discussed. In the latter respect the volume is still appropriately entitled "Elements of Dental Materia Medica."

PERISCOPE.

The Influence of the Nervous System on the Health of the Mouth.—For some years I have been much interested in noticing the conditions of the nervous system in connection with the health or disease in the mouths of persons coming under my personal observation, and I will as briefly as possible state some conclusions arrived at from such observations.

We are well aware that there are various degrees of nervous activity or restlessness, as well as weakness, also strength or tranquillity, not only in different individuals, but frequently in the same individual at different times.

We also know that the health of the mouth varies in different persons, as well as in the same person at different times. Let us look at the extremes of each.

In regard to various mouths, they may be considered chemically, as in two classes, the alkaline and the acid. I allude to the general character of the fluids of the mouth, without reference to any diversity that may sometimes be found in its various secretions.

In the alkaline mouth we usually find it of more dense structure, and not easily affected by what are considered injurious agents, and only so affected when such agents find very obscure lurking-places for some length of time. In this mouth the general character of its secretions is so decidedly alkaline that they act as a constant and effective neutralizing agent to any acid influence within their reach.

On the other hand, we find in the acid mouth, though the structures are less dense, that it is more easily affected by acid elements taken into, as well as readily developed in.

Now, if we observe, we shall find existing with these two extremes of condition corresponding extremes in the condition of the nervous system, which may be classed as tranquil or strong, and restless or active (or weak).

In the tranquil we find sufficient strength of nerve-power to take the individual along in life with a comfortable feeling of reserved strength, usually attended by good digestion.

The nervous system may be constitutionally quiet or strong, or even stolid, or there may be such freedom from continued care or close application that the nervous power is not actually tested or overdrawn.

But in the restless or active condition, we see perhaps, a constitutional disposition to activity of mind or body, or both; or else a state of health, or a continued pressure of circumstances that draws so unremittingly on the stock of nerve-power that there is not sufficient opportunity to acquire a proper reserve of that power, often resulting in various uncomfortable sensations and not unfrequently attended by dyspepsia.

Besides some states of health and local conditions in the human organization that are known to produce this unsettled state of the nervous system, there are various other causes, some of which perhaps are necessary attendants on our civilization, that no doubt contribute most largely to its very general existence. Such are the constant cares and anxieties of business, social and domestic life, and the strong and continued pressure, through ambition or otherwise, imposed on the energies of growing youth during a large part of the year; and we daily see the effect of the various causes of overwork, as shown by their results in the mouths of patients.

My conclusions are, that where the nervous power is not unduly active or overdrawn, as a rule, the digestive system will be in such condition that the general character of the secretion of the mouth will be alkaline and corrective of acidity, which will likewise prove a source of destruction to the teeth. And, on the other hand, that where the nervous system *is* unduly active, or its powers overtasked for a length of time, we may expect to find the fluids of the mouth tending to an acid character in proportion to such overdraft.

Also, to reverse the rule, whenever we find its membranes strong and healthy, we may diagnose a tranquillity of nerve; and whenever we find them in a flabby condition, of a white and acid character, we may be equally sure that the nervous system is or has been for some time overtasked.

Of course, in practice we see all degrees between the extremes I have mentioned, but I am satisfied their proportions will be found to correspond, if close observation be given.

These conditions may exist under favoring circumstances for a large part of one's lifetime, or they may vary at different periods of life and under different circumstances, so that we sometimes see a mouth which has always been healthy; but how much oftener do we see the contrary.

In general times, then, the result of these observations has been to prove (other things being equal) that so far as tranquillity of nerve prevails, so far we may expect soundness of the membranes of the mouth, and in proportion as the restless condition exists in continuance, in that degree will there be disease in the mouth.

Much might be said of the various evidences of this rule; and a correct appreciation of it will be found of great utility in enabling us to decide when and how to attempt the treatment of an organ which plays so important a part in the animal economy, and which, in a sound condition, contributes so much to the health and comfort, the happiness and comeliness of the human race.—*Worthington Myers, A.M., M.D., in Cincinnati Lancet and Clinic.*

GUM CUTTING AGAIN.—Among the many able and interesting articles contributed to the *Journal* by the late Prof. C. Buckingham was one on the propriety and usefulness of the operation of cutting the gums of children in appropriate conditions. Some time previously the question had been asked, derisively, Who cuts gums? A very decided answer, with reasons, was made by a correspondent, E. T. W., which seemed to settle the matter in its favor. At least my already written reply that I did was committed to the waste-basket, as I thought that enough had been said to convince the most skeptical. Grave doubts of its utility under any circumstances seem to exist.

There have been objections to the operation from excessive hemorrhage. Professor Buckingham had never seen or known of such a case. Yet I have to confess to one thirty years ago. The child was eight months old, and the lower incisors were cut. The oozing of blood continued till death, at the end of four days. In endeavoring to find a cause for it I remembered that instead of cutting directly on to the tooth the instrument glided inside, which may or may not explain its fatal result. To prevent any like occurrence I have always since cut them with the finger on one side and the thumb on the other, compressing the part while passing the lancet to the tooth, rendering it impossible to slide down either side or outside. Apart from this case, I have cut hundreds before and since, and seen no harm done.

When should the gums be cut? I mean by cutting not scarifying, but cutting down to the whole diameter of the tooth. If the gums of a child in a fit are swollen I always cut them.

Strong, well-fed children usually are not the ones troubled with teething irritation.

Prof. Eli Ives, of New Haven, taught his students that nature's outlet for teething irritation was by the bowels, ears, and the eruption of the tooth through the gum. Hence a mild diarrhœa, sores behind the ears, cutting the gum, all done artificially if not naturally, are the best means to relieve urgent symptoms. Dentition produces serious disease of itself, besides adding increased trouble in many of the diseases of children.

I have seen as prompt relief by cutting the gums in teething children as in the extraction of a tooth for toothache. A child of two and a half years had a fit which lasted two days, with startings and cryings, so that its parents were obliged to carry it in their arms. On examining the mouth the second molars were much swollen. I made a cross-incision over each. The child was instantly relieved, so that it wanted to get down, and was on the floor with its playthings, laughing, when five minutes before it was in an agony of restlessness and nothing could satisfy it.

In another case the child was not only relieved but gratified by the pleasant sensation of the cutting, and opened its mouth to have me try again before leaving. Some days after, when visiting another case, the child came up with its mouth open.

Helping the wisdom-tooth through by cutting down upon it many of us know to be a great relief, and we can thus realize how the tender child must often suffer for want of the same treatment. It would seem also that the swelling of the gums in either case was not the result of biting upon hard substances, as a late contributor to the *Journal*, April 25th, suggests, but from the tooth itself.

In a clinical lecture on disorders occasioned by the development of the dens sapientiæ, by Professor Velpeau at La Charité Hospital, as reported in the *Medical Library*, September, 1846, is the following: Besides four vicious directions of the tooth backward, forward, inwards, and outwards, there is a fifth one directly upward, caused by the tooth merely pressing against the gum, and being thus impeded, as in the case presented, producing severe pain in the face and mouth, with swelling, so as to close the jaws. The jaws were forcibly opened by a wooden wedge, and free division was made down to the tooth, resulting in immediate betterment. He related this case to M. Esquirol, who informed him that a lady had been brought into his institution laboring under mental derangement, and was restored to reason by a crucial incision of the gum, which liberated the wisdom-tooth.

Previous to reading this article I had a case of complete closure of the jaws, existing for ten years, which the lady said started from her wisdom-tooth, doubtless caused by some failure of the tooth to come through. She died soon after, and I had no means of verifying my belief.

If such are the trials of teething in adults with merely the gum as an obstacle, and prompt relief is afforded by cutting, shall we deny this boon to children, among whom the results of difficult dentition are frequently fatal?—*John Yale, M.D., in Boston Medical and Surgical Journal.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

WILL some reader of the DENTAL COSMOS explain and prescribe treatment for the following case? A young lady patient of mine is troubled every few weeks by an extreme soreness of the gums near their margins. At these times the teeth affected will bear direct pressure, such as is made in closing the jaws, without pain, but are very sensitive to lateral pressure. The trouble is not confined to any particular tooth. At times a small fistula will form and discharge pus, which generally ends the trouble for the time being.—B. W. M.

I THINK my professional brethren who are troubled with dark joints in vulcanite work will find that the greatest difficulty arises from allowing wax to enter the joints,—particularly melted wax. Wax adhering to the sections cannot be thoroughly removed in preparing the case for packing. Whether dry heat or boiling water is used, a gummy residue still adheres to the teeth, which prevents plaster or oxychloride from touching the sections, and when pressure is applied, allows rubber to be forced through. In grinding up I make as perfect a joint as possible; then make the V space, to be filled with plaster before packing. If hot wax gets into a joint while fixing the teeth to the base-plate, I immediately remove the sections and thoroughly clean them. In removing wax, preparatory to packing, I never allow the case to get warm enough to make wax sticky.

For "C. W. S," who makes a query in the January number, I will relate my experience with *one* case, which he can take for what it is worth. I made an upper set for a gentleman, packing the joints, which were V-shape, with a thread dipped in thin oxychloride, according to a plan given in "Hints and Queries." A few months after I had occasion to mend them. The case came out with joints as clear as the first time. I think if this precaution was taken, or even if clean joints were carefully packed with oxychloride in all cases, we would have no trouble with dark joints at first, or in mending.—R. B. TULLER, *Cuba, N. Y.*

DOUBTLESS others beside myself have been annoyed by the *bleaching* of celluloid plates when heating them up to replace teeth. I have found that covering the plate with tin foil will effectually prevent this trouble. If the surface of the plate is moistened with spirit of camphor it will facilitate the application of the foil.—P. B. LASKEY, D.M.D., *Marblehead, Mass.*

THE USE OF SULPHURIC ACID IN NECROSIS.—I have just noticed an article in the November number of the *Missouri Dental Journal* with reference to the first suggestion as to the use of sulphuric acid in necrosis. It might readily be inferred from this article that some unwarranted claim had been made in reference to its use in dental practice. As a matter of simple justice to Dr. W. H. Atkinson, of New York, allow me to say that he was unquestionably the first to suggest its value to the dental profession, without making any claim whatever for introducing it in medical or surgical practice, although he related several instances of its employment by him while engaged in the practice of medicine in the West, years previously, and detailing, as I remember, its employment by him in a case of necrosis of a lumbar vertebra. It was at the Brooklyn Dental Infirmary that I witnessed, with a number of other Brooklyn dentists, his demonstrations of its value in several cases.—GEORGE A. MILLS, *Brooklyn, N. Y.*

THE

DENTAL COSMOS.

Vol. XXI. PHILADELPHIA, MARCH, 1879. No. 3.

ORIGINAL COMMUNICATIONS.

CARIES OF HUMAN TEETH.

BY FRANK ABBOTT, M.D.,

PROFESSOR OF OPERATIVE DENTISTRY AND DENTAL THERAPEUTICS IN THE NEW YORK COLLEGE OF DENTISTRY.

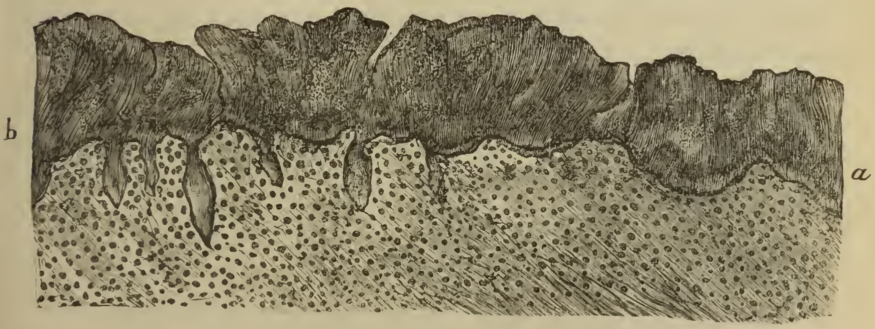
(Read before the New York Odontological Society, December 17th, 1878.)

(Continued from page 64.)

Caries of Dentine.

Upon examining a large number of teeth with carious dentine, we are struck by conditions to the presence of which no observer has as yet drawn attention. Sometimes the dentine looks but little changed; on its periphery attacked by caries. A narrow zone of yellowish color forms the boundary toward irregular, shallow excavations (see Fig. 2, letter *a*). At other times, besides the bay-like excavations on the periphery, there are visible elongations, cylindrical, conical, pear-shaped, or leaf-like, passing down into the dentine in varying depths (see Fig. 2, letter *b*). There is no doubt that this form of decay of

Fig. 2.



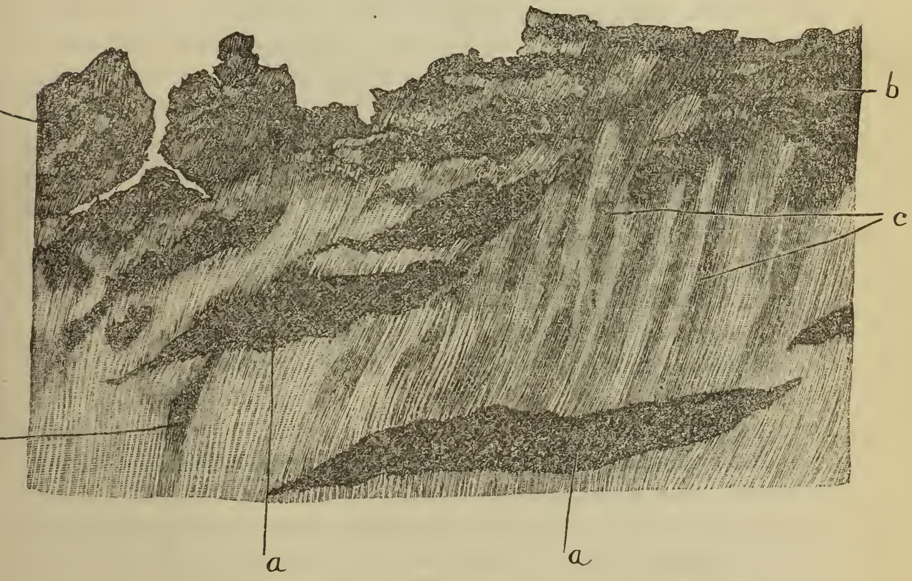
the dentine occurs with the least preliminary changes of the tissues; it evidently runs a slow course, and I think I am justified in calling this form of caries chronic. It seems evident that decay of a tooth assumes an acute or chronic form just in proportion to its perfect or imperfect calcification. Dead teeth in which the pulps have been destroyed either by necrosis as a natural process, or by artificial means with caustics, very frequently run this kind of slow or chronic decay. The decay of artificial teeth, either human or ivory, in all probability runs either an acute or chronic course, according to the amount of lime-salts infiltrated into the glue-giving basis-substance.

I have examined a piece of a hippopotamus tooth which for a period of about one year was worn in the mouth of a patient, and a spot became decayed about the size of a hemp-seed. I softened this piece with chromic acid solution, imbedded it in paraffin and wax, and cut thin sections with a razor. On the bottom of the decayed pit numerous conical spots appeared running downward into the dentine, characterized by the absence of coloring matter in specimens stained with carmine. No material change besides was observable; even the dentinal canaliculi did not look enlarged. The bottom of the carious cavity was covered with a layer of finely-granular, evidently disintegrated organic material, and above this the ordinary mass filling carious cavities in teeth, viz., micrococci and leptothrix, were visible.

In chronic caries merely a chemical process takes place, assisted by putrefaction of the organic constituents of the tooth. Here first the solution of the lime-salts of the dentine takes place, either along the bay-like excavations or in the shape of longitudinal depressions. No reaction whatever follows this process. The glue-giving basis-substance being deprived of its lime-salts shows a yellow discoloration, and only traces of the dentinal canaliculi. The basis-substance then breaks down into an indistinct granular mass, which is immediately filled with a new growth of low vegetable organisms, viz., micrococci and leptothrix.

My specimens plainly show that these organisms are not the *advance-guard* in the process of decay. The first change that takes place is exposure of the basis-substance by the chemical action of some acid, independent of the named organisms which come to view only after complete disintegration of the basis-substance. I never have seen the penetration of these organisms into the dentinal canaliculi before a thorough decalcification of the basis-substance had taken place. No doubt, however, the decayed mass itself may be crowded with such organisms which they seem to form with. In the great majority of my specimens I have met with formations on the diseased boundary of the dentine which demonstrate a considerable degree of reaction, produced by the irritating power of the same agent to which the lime-salts of the dentine yield. In fact, this was the case in all teeth which were alive when attacked by the carious process, or rather when removed from the jaws. On the boundary of this process we see irregularly-shaped elongations running a certain depth into the tissue of the dentine. The more superficial the elongations are, the surer the morbid process may be termed a slow one; and, on the contrary, the deeper the elongations, the more certain we may be that the morbid process has advanced rapidly. The elongations mainly have the shape of fissures filled with a dark granular material, if viewed with a low power. These fissures run independently of the direction of the dentinal canaliculi; nay, very often cross them (see Fig. 3, letters *a a*). In the specimens they look as a rule as if communicating with each other, and also directly or indirectly with the decayed outer surface. Sometimes the fissures look completely isolated, though we may assume that they are separated from the communication with analogous and more superficial formations only by the method of preparation, viz., cutting into thin lamellæ.

FIG. 3.



On the surface of the carious portion of dentine we see irregular cavities filled with the same granular mass that is present in the fissures, consisting evidently of débris of the former tissue, together, perhaps, with micrococci, and very often fine thread-like leptothrix. The more rapidly the destruction of the dentine has advanced, the more irregular islands of dentine are left on the surface (see Fig. 3, letters *b b*).

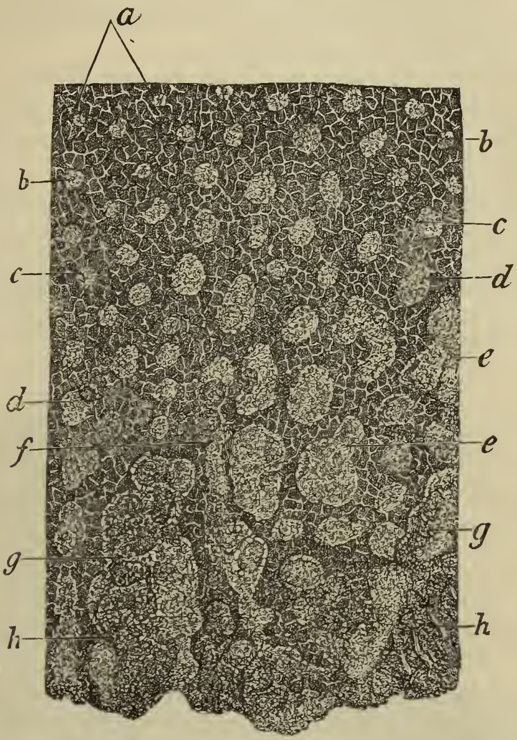
In our figure the decay evidently has proceeded rapidly; hence the remnants of the former dentine, recognizable by the presence of the canaliculi, are very small and irregular on the outer periphery of the dentine.

The outermost portion of the decayed part is, as a rule, brittle, and crumbles away in chromic acid specimens. Where it is left it shows a crowd of leptothrix and micrococci, without any distinctly recognizable remnants of the former tissue. On the boundary of the carious portion we, as mentioned above, meet with a yellow discoloration of the dentine, evidently produced by a chemical agent, which first dissolves out the lime-salts from the dentine, and in turn liquefies the glue-giving basis-substance. In live teeth the yellow discoloration usually takes place in the shape of longitudinal strings of different diameters, running mainly parallel with the longitudinal direction of the dentinal canaliculi. Nay, we often see single yellow strings running from the bottom of a carious cavity in the enamel through the whole depth of the dentine to the pulp-chambers (see Fig. 3, letters *c c*). The best method for demonstrating these strings is doubtless the staining of chromic acid specimens in an ammoniacal solution of carmine. While the unchanged dentine readily takes up the carmine, the strings, the deep yellow color of which is undoubtedly due to the action of the chromic acid, remain unstained.

With a power of about five hundred diameters, we recognize under the microscope, in longitudinal section of the dentine, that sometimes the yellow discoloration has taken place only within the limits of a few dentinal canaliculi, while at other times quite a number of these have undergone discoloration. Still sharper defined is the yellow discoloration on transverse sections. Here we see that mainly the canaliculi and their immediate neighborhood have taken up the yellow color in the shape of sharply-circumscribed dots, which are the larger the nearer they approach to the periphery of the decayed part. The basis-substance between these yellow spots has taken up more or less carmine. Let us examine such a cross-section with a magnifying power of one thousand diameters under the microscope.

At a certain distance from the decay the canaliculi look unchanged, and each contains the central transverse section of the dentinal fiber with its delicate radiated offshoots (see Fig. 4, letter *a*). Nearer to the decay we meet with moderately-enlarged canaliculi, the center of which is occupied by a cluster of protoplasm, the granules and threads of which have readily taken up the carmine (see Fig. 4, *b b*). One step farther we find the canaliculi considerably enlarged, to double or treble of their original size, and they are filled with yellow protoplasm, plainly exhibiting the net-like arrangement of the living matter (see Fig. 4, *c c*). The most peripheral granules send delicate conical

FIG. 4.

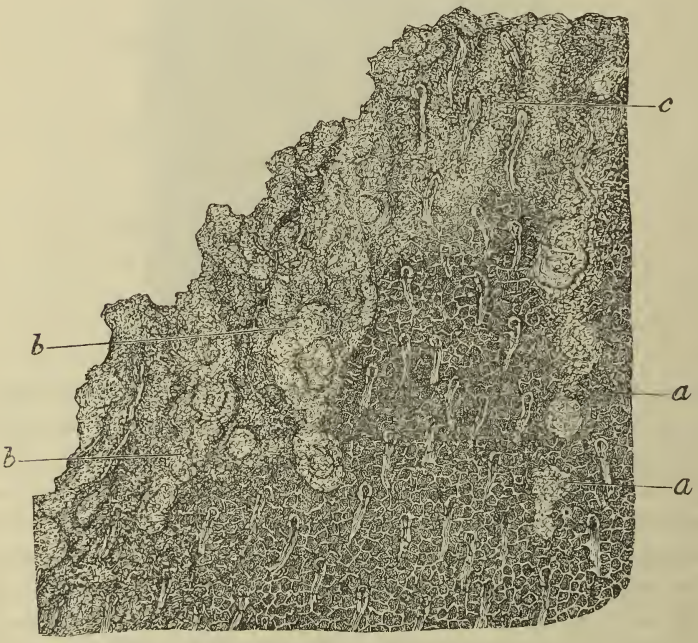


offshoots through the surrounding light space toward the unchanged basis-substance. In some of the enlarged canaliculi accumulations of living matter are seen fully in the shape of nuclei; sometimes two or more such nuclei may be seen surrounded by a varying amount of protoplasm (see Fig. 4, *d d*). Still nearer to the decay the canaliculi are enlarged to ten or fifteen times their original diameter, and the cavities thus produced are all filled with a partly-nucleated protoplasm (see Fig. 4, *e e*). Between the roundish cavities we meet with longitudinal cavities, arisen from the confluence of several cavities in one main direction (see Fig. 4, *f*). The cavities continue increasing in size, and form large spaces, with rounded, bay-like boundaries, between which only scanty traces of unchanged basis-substance are left (see Fig. 4, *g g*). Lastly, the basis-substance has entirely disappeared, and only protoplasm is visible in its place, either in the shape of multinuclear layers or of irregular so-called medullary elements with rather faint marks of division (see Fig. 4, *h h*). Nearest to the periphery the protoplasm does not exhibit any form elements, but looks like a disintegrated granular mass, probably intermixed with or replaced by micrococci. I say probably, inasmuch as all good histologists agree, nowadays, that the diagnosis of micrococci is possible only when they are clustered together, which is not always demonstrable even in the thoroughly-decayed mass.

We have a series of changes of the dentine fibers, and the surrounding basis-substance of the dentine before us, which I have not the least doubt is the normal procedure of the transformation of dentine by the carious process.

Figure 5 is an oblique section, and illustrates exactly the same changes from a tooth attacked by a less acute caries, perhaps owing to its greater solidity or more perfect calcification. Here a relatively small number of dentinal canaliculi are enlarged, and filled with protoplasm (see Fig 5, *a a*). The center of the protoplasmic bodies is occupied by one or two nuclei, which look as if they originated from the former dentinal fiber. On the periphery of the dentine there are regular nests filled with protoplasmic formations of the above description, partly broken down into medullary elements (see Fig. 5, *b b*). On other parts, on the contrary, the transformation of the basis-substance into protoplasm has even preceded the changes of the dentinal fibers (see Fig. 5, *c*). The canaliculi are not noticeably

Fig. 5.



enlarged; the dentinal fibers either unchanged or slightly swollen, and more granular than in the normal condition; while outside these we have a thoroughly decalcified and liquefied basis-substance, which means a reappearance of the network of the living matter before the stage of disintegration.

(To be continued.)

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

FORMERLY PROFESSOR OF DENTAL PATHOLOGY AND THERAPEUTICS IN PHILADELPHIA DENTAL COLLEGE.

[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 69.)

Periodontitis—4th cause of odontalgia—*Symptoms.*

The *symptoms* of periodontitis are *soreness of the tooth;* a desire to work or move the tooth, either with the fingers or by touching with an antagonizing tooth. This condition of things soon gives place to *more decided pain*, together with *throbbing;* at this juncture, temporary relief will usually be afforded by *continued pressure.* Violent pain is given from striking a smart blow upon the affected tooth.

This second phase soon gives place to *acute pain, continuous*, with *marked difference*, as regards sensibility, upon *very gently* striking the diseased tooth and healthy teeth.

The *signs* of periodontitis are, *first*, a *change* in the *health line.*

Upon raising the upper lip and *especially* upon depressing the lower lip, a very marked difference will be noticed in the *color* of the gum, which *in health* festoons the necks of the teeth and covers the external alveolar plate for a distance of about two-thirds of the length of the roots of the teeth, with a tissue of a *pinkish* hue, and then *suddenly* changes to a shade of decided red, or *even dark purple.*

The *line* of demarkation between these two colors I denominate the "health line," and the clearness with which this line is defined is *usually* a very correct guide as to *grade of health.*

It is true that exceptions to this occur as regards individual expression, from which cause it *may be* that all the gum-tissue and dental organs can be in a comfortable state, and yet with *no health line* existing.

In such cases, however, it will equally be recognized that such normality is of a *low grade*, that the parts are plethoric, turgid, and not in good, firm, satisfactory condition.

The "health line" is usually found marking the gum just at the origin of the mesial fræna, both above and below, and is as generally a very delicate indicator of existing irritation, either external or internal.

So decidedly is this the case that a slight rubbing of the gum with the end of a finger will, *for the moment*, completely obliterate the "health line," and, as has been stated, any irritation from within about the apex of the root will, as decidedly, give as its first *sign* (*visible*) a *change* in this line.

This change is termed an *interference*, and the extent of change determines the *gravity* of the *interference.*

As the deviation from normality increases, it is reasonable to expect, as *secondary* concomitants with increasing soreness of the tooth, more and more interference with the integrity of the health line, more decided *redness* (suffusion) of the pinkish portion of the gum, some swelling, and some sensation of heat.

These contemporaneous deviations aggravate until with continuous acute pain and violent throbbing, with exceeding soreness of the tooth *upon touching* never so gently, with decided sense of *elongation of the tooth* upon occlusion, and with excessive pain from *very gently* striking the sore tooth, causing shrinking and evident suffering, we have the redness of the gums increased in extent, the swelling and the warmth of the parts *in a degree* augmented, and the health line interfered with to the extent of *complete obliteration.*

At this time I wish to impress the knowledge of the fact that the most painful and uncontrollable periodontitis may exist without the slightest interference with the health line; but these cases are quite rare, and this very circumstance seems to be in great measure indicative of the uncontrollable character of the periodontitis.

This peculiarity is usually found in connection with such extraordinary pathological conditions as "pulsating pulps," "nodular calcifications," "absorption of the roots of permanent teeth," "circumscribed or apical exostosis," and sometimes with "apical (or partial) necrosis of the root."

I regard it as a *bad sign*, but *not* as positively indicative of incurability.

Results.—For the sake of ease of consecutive description and of clearness of perception, let us take as a case for illustration, one of periodontitis from excess of filling material upon the articulating face of a tooth.

By means of this "excess" the *strike* in occlusion of the teeth is made entirely abnormal, the *bearing* is taken off from eight, sixteen, or thirty-two teeth, as the case may be, and given to *two;* of these either the tooth containing the excess of filling, or the antagonizing tooth which occludes upon the excess, or both, will gradually become sore. The least degree of irritation results in what is very appropriately and exactly termed "a knowledge of the presence of the tooth." We have now a membrane, the periodontium, being mechanically irritated; as the result of this irritation we have an increased flow of blood (determination of blood) to the parts; as the result of this combined irritation (nervous) and increased circulation (vascular) we have the concomitants of hyper-nutrition (extra vascular) and hyper-sensation from this soreness and throbbing. It is at this juncture that temporary relief may be given by continuous pressure.

The irritant still acting, we have increased irritation and increased circulation until it amounts to that which I have accepted as "congestion," or generally impeded circulation (too much blood in a part, with its motion diminished, is the microscopic *sign*).

Concomitant with this we have the vessels of the periodontium becoming filled with blood; we note that exudation of the thinner blood (non-organizable exudates) takes place, increasing (actually) the bulk of that membrane which invests the root and lines the walls of the alveolus.

This thickening of the membrane gives to the tooth an *actual elongation*, and it is therefore natural that it *should* "feel too long;" but to this is added a hyper-sensibility which gives to this elongation a *seeming magnitude*, which causes the patient to say that the tooth is "a *great deal* too long."

The pain now becomes a dull, unremitting, and persistent sense of *weight*, with *sometimes* "fullness" (though this *peculiar* sensation is usually quite diagnostic of periodontitis from *putrescent pulp*). Striking the tooth is gradually becoming more and more painful, and the pain seems to increase in *size*,—it is more diffused,—and the "knowledge of the presence of the tooth" passes into the most distinct localization of suffering.

Again, this second phase gives place, as I have said, to *acute pain, continuous*, with now *marked difference* as regards sensibility upon *very gently* striking the affected tooth and any of the healthy teeth.

By this time we have that deviation from normality which was described in the earliest of these papers as "true inflammation,"—a condition in which is found an *intensity* of altered action which so complicates circulation, so heightens sensibility, and so interferes with nutrition as to promptly endanger the vitality of the part most seriously diseased, and equally to threaten extensive injury to surrounding tissues.

It is now that we have both pain and throbbing *most* severe; it is now that the possibility of occlusion is entirely precluded; it is now that the sense of *elongation* is magnified until it is expressed by patients in most extravagant terms, as "a *foot* too long," "about a *yard* too long," even "a *mile* too long," and the like; and *it is now that "periodontitis" is pronounced.*

Treatment.—The study of the various means for relief which the practitioner is liable to require in combating *periodontitis* renders necessary the division of its treatment into *preventive* (by which I desire to be understood as referring to the *prevention* of the *increase* in severity and *extent* of the inflammatory action) and *curative*, under which I shall discuss those peculiar considerations regarding treatment which are dependent upon the *type* of the inflammation.

The prophylactic or preventive treatment of *any inflammation* is based upon *three local* and *two general* considerations.

The *local* treatment is of the first importance, as upon this depends a certain degree of immediate amelioration,—a result desirable both for the comfort of the patient and the reputation of the practitioner.

The *local* treatment consists, 1st, in the removal of the cause of irritation, either vital or mechanical; 2d, in insuring the absolute rest of the parts; and 3d, in the application of tonic, astringent, stimulant, counter-irritant, or sedative remedies, as the case may require.

The *general* or *constitutional* treatment consists, 1st, of regulations concerning diet, rest, and exercise; 2d, in the administration of some aperient, as citrate of magnesia or Seidlitz mixture, to act as a mild *derivant*, or sulphate of magnesia (Epsom salts), to act as a *drastic purgative*, thus obtaining the benefit of "derivation" in a full and decided degree.

The *curative* treatment of inflammation depends upon the *character* or *type* of the inflammatory action, and in view of this I shall discuss *periodontitis* as of two classes: 1st, sthenic, acute, or circumscribed periodontitis; and 2d, as chronic or diffused periodontitis.

Inasmuch as cases of peridental irritation are of quite frequent occurrence which, although more or less rapidly approaching *true periodontitis*, have not as yet reached that positively inflammatory condition, it seems proper that, under the statement that treatment is also modified in dependence upon the *violence* of the irritation, as well as upon the *type*, reference should be made, *first*, to *slight peridental irritation.*

In such cases *local* treatment alone is usually sufficient for the prompt and complete control of the existing difficulty; but, inasmuch as *thoroughness*, in its *great and true acceptation*, is here indicated *just as urgently* as it ever is in the gravest case of practice, I shall speak at length, now, upon that point, in this connection, concerning which I have ever tried to be particularly impressive:

1*st. Remove the cause of irritation.*—Under the heads of "want of occlusion," "mal-occlusion," "salivary calculus," and "looseness of tooth or root," I have, I think, given sufficiently explicit directions in regard to the removal (if possible) of these *causes* of peridental irritation.

Under the head of "induration of tooth-tissue," I have pictured the hopelessness (at least with our present knowledge) of any attempt at the removal of this *cause* of trouble.

Under the heads of "cavities of decay infringing upon cementum," and "mechanical irritation, injuries, etc.," I have also given all that seems to me needful for a proper appreciation of such means for relief as have proved successful in practice.

Under the head of "dental manipulation," I referred to the frequent allusion to this "fruitful cause" (as it is termed) of peridental irritation, and endeavored to impress the idea that with all this constant mention upon the part of so many, it yet seems very little, and but vaguely understood, what *really* constitutes *that kind of dental manipulation* which *properly* must be classed as one of the causes of periodontitis.

Broadly stated, it is not proper that any kind of dental manipulation should be productive of any evil result, much less of so grave a one as peridental irritation, and still less, again, of so direful an infliction as *periodontitis;* and yet, while these unfortunate occurrences are usually due to misapplied energy, overestimates of the capability of tissues for endurance, or in many instances to actual ignorance of that which is undertaken, I still wish to state that the *best directed efforts may eventuate in just this deplorable result.*

But I also desire to state, that there is no doubt but that just in proportion to the degree of appreciation on the part of the practitioner, of the varied requirements upon the parts of the divers tissues and organs interfered with by the dentist, so will the liability to such untoward occurrences decrease.

There has been, for many years, a word, excellent in itself, *but from its very excellence* liable to great abuse, that has been kept at the mast-head of dental practice.

This word is "*thoroughness.*"

Now I wish to place myself *upon the record*, as stating that I hold to the opinion that *such practice* as has been developed by the usual *teaching*, and the usual *acceptance* by the profession of the *signification* of this term "*thoroughness*," is responsible for the *largest share* of the dreadful amount of infliction which has been imposed upon the community by our profession, and also for the *largest share* of the *loss of such teeth as have been lost* by patients who have been *regularly*, *from childhood*, under the constant charge of recognized "best" practitioners.

I have made this statement carefully, and I do not very strongly desire to be misunderstood, nor, above all, to be misrepresented, as I mean *just what I have said.*

Among the earliest of the representative men of dentistry, there soon came to be an apparently laudable emulative strife as to a style of operating which possessed, in every particular, the charm of "thoroughness."

If teeth were to be extracted, in order that a pure and cleanly mouth should result, and that no decaying roots or teeth should remain *to decay the rest* (!), *every* tooth, "too much decayed to be filled," and *every* root was removed. This was "*thorough.*"

If teeth were decaying upon their mesial or distal surfaces, and an attempt to save them by "filing" was to be made, *large* V-shaped openings were ruthlessly cut between bicuspids and molars, and thick flat or half-round separating files made *wide slots* between incisors and cuspids. This was "*thorough.*"

If cavities were to be prepared for filling, every particle of decay was removed, regardless of all other considerations except the *one*, that being decayed, or indeed in the least softened, was reason sufficient for its removal, and *also* reason sufficient as to *why* it *should not remain.*

"Thoroughness" in preparation, and "thoroughness" in *excavating*, were synonymous to the dental mind; and "thoroughness" in excavating meant to cut out *every particle* of softened dental tissue, and cease work only when "good, hard, solid structure" remained to be filled upon. This was "*thorough.*"

When deep-seated roots were to be extracted, and forceps had become an accepted institution, such as would cut through jaw-bone and all, dignified by the name of "alveolar forceps," were hailed as improvements, and jaws were "thoroughly" cut up.

The first steady and unremitting attack upon this peculiar view of "thoroughness" was that made by Prof. Robert Arthur in enunciating, and fearlessly and *successfully* promulgating as a "principle," that "*thoroughness*" at times, and under certain conditions, *could only be attained* by *leaving* a portion of decayed dentine untouched in the cavity and filling thereupon.

This was a dreadful blow to the settled and time-honored ideas of the "best men." But *some of these* remembered the stand they had taken in the "Arsenic War," how they had jeered at the "*ratsbane*" and reviled the "*unscrupulous* men" who "shamelessly" introduced it into the cavities of the aching teeth of their patients; and others still smarted from the wounds they had received in the "Amalgam War," and felt keenly their defeat in that most powerful attempt to *compel* gentlemen *not to use* a material which even one of its most notable opponents, Dr. E. Baker, was so soon obliged, conscientiously, to contend "in certain cases could be judiciously employed." So, although Prof. Arthur was assailed as a teacher of "false doctrine," and although his practice was denounced as subversive of the best interests of our profession, as opening the gates for utter shiftlessness in operating, and above all as eminently calculated to impair the luster of that doctrine of "thoroughness" upon which the unparalleled success of American dentistry so much depended, it was, nevertheless, advocated so strongly and so persistently before his classes and the profession by its promulgator, and was so strenuously and continuously supported by those who embraced his views, that in a comparatively short space of time the *teachings* from every dental lecture-stand were in consonance with his ideas; and "accepted" *thoroughness* in *dental manipulation* in connection with cavities of "deep decay" consists in leaving a stratum of decayed dentine therein, and filling thereupon, in all cases where its removal would endanger the safety of the dental pulp.

Now the point I propose making is, that "thoroughness" in *dental manipulation* can probably be modified quite as advantageously in a great many other directions, to the end of vastly increasing the *saving of teeth.*

(To be continued.)

IS VITALITY A FORCE?

BY T. DWIGHT INGERSOLL, ERIE, PA.

THERE was a time in the history of the earth when the lowest and simplest forms of life could not exist. Subsequently geological changes made it possible not only for their existence, but for the existence of higher and more complex forms. Succeeding changes rendered the earth more favorable to life, and were followed by still higher forms, showing progress in complexity of organization and a higher order of consciousness, until those attributes culminated in man. These changes in matter, followed by coincident changes in the animal and vegetable kingdoms, show that a relation of dependency exists between them, and that relation exists, it is believed by many naturalists, through the combined action of the inherent forces of nature, without the aid or influence of vitality or any other extraneous power. This, however, is at variance with the general belief that all animated nature is under the influence and power of vitality, without which every animal, every plant, and every man would die. No class of men, perhaps, hold to this belief more tenaciously than those belonging to the medical and dental professions. On the contrary, no class of men have so little to say about the theory, except to oppose it, as those who have made the greatest attainments in the study of nature. Some, instead of going down among the natural forces for the causes of disease and premature death, have wandered off into regions of mystery, where they vainly think the forces of nature "act only in subservience to the demands of vital energy in all its behests."

A few extracts from dental and medical journals and the published transactions of societies will illustrate.

In speaking of vitality as a power to resist heat and cold, Dr. Dwinelle says, "The great principle of vitality which underlies the whole human economy will accommodate itself to the most extraordinary extremes, as we find manifested in many other directions. A vitalized body will endure cold down to eighty degrees below zero, Fah., with the greatest impunity, and from some of our own tests in the Turkish baths I have reason to believe that the human system is able to endure a temperature of two hundred and seventy degrees of heat in perfect safety."

Is "the great principle of vitality" an existence, an entity that "accommodates itself" to these extremes? Is it not the nervous system and the elements of which the body is composed that endure the heat and cold? The body does not freeze at eighty degrees, because the heat evolved by chemical action within prevents it from falling far below its normal temperature. When it is subjected to a heat of two hundred and seventy degrees, the moisture evaporated from the surface prevents a burning fever. If these natural processes enable the human system to endure heat and cold as above indicated, why attribute the phenomena to "the great principle of vitality"?

In regard to changes in dentine by the deposition of lime-salts, Dr. Judd says, "We have been accustomed to look upon this word (deposition) as simply specifying a deposit, without any action connected with what we have considered as a vital power. This is the sense in which it is generally used; and if this is the sense in which it is used here, I shall beg leave to differ from those gentlemen who consider this deposition as entirely independent of any vital force, because I believe that to a certain extent the deposition of the earthy deposit within the cell is brought about by vital force."

These changes are of constant occurrence, and are regarded by naturalists as natural processes. They see no more vitality in changes in dentine by deposition than they do in salivary calculus deposited on the enamel, or in the coralite, where the carbonate of lime is secreted by the coral-making animal and carried to the radiating septa of its body, where deposition takes place in coral form. They see no more vitality in the calcification of a dental nerve than they do in the incrustation of a steam-boiler, or in the petrification of a piece of wood when particle by particle the structure gives way to particles of stone.

A similar result from force-action is seen in the vegetable kingdom.

The grape-vine takes up lime in solution and makes nodular deposits in the fruit. If, before that takes place, the grapes be crushed, cooked, and canned, small nodules of lime-salts will be formed throughout the mass. When the grapes are made into wine, the lime will incrust the surface of the cask. The mineral kingdom also exhibits a similar "coming together and going apart" of its elements. Those hollow chalcedony balls called geodes that are generally lined with quartz crystals are sometimes found with crystals of lime (calcite), shut in with the quartz. They are united to one another on some of their sides, each liquid being crystallized according to its own law. Such aggregation and segregation of rock-making materials has always been observed in the formation of various rocks, and why not attribute those phenomena and all others in the mineral kingdom to vitality?

If vitality be anything more than a phenomenon, what becomes of it in a branch of a tree when severed from its trunk and left to decay? What becomes of vitality in the arm of a man after it is amputated, or the vitality of any living thing after it is dead? These questions ought to be regarded as pertinent, and the "vitalist" ought to be able to give a satisfactory answer if his theory be true. It has been said "vitality dies with the organism," but the doctrine of the "conservation of energy" teaches that *forces never die, they are eternal.*

Dr. Ingersoll uses life and vitality synonymously, and says, "Life is a force. It is not a condition of motion, but a cause of motion. In conformity with this idea we have in language various combinations and forms of words to express this commonly-received fact; such as organic life-force, curative power; and we say of it that it *acts*, it *operates*, it *exerts*, it *performs*, etc. Vital force, as creative of motion, creates the most important distinction we know of in matter, and is the basis of the division of the entire universe into *living* and *dead* matter. . . . Again, vital force, which imparts motion to matter and transfers it from the division of *dead* matter to that of living matter, is distinct from the motion itself; so that we can in no rational sense say that life is *motion.* It sustains to it the relation of cause to effect. This relation implies succession. The motion succeeds the pervasive presence of vitality, and must therefore be distinct from it. As an organic force it builds up organs and maintains functions."

The above declarations virtually put phenomena in the place of causes, "create" a force that has no existence, and deny the sufficiency of energy in nature for the continuance of life. But let us turn from this "field of nebulous mists" to the basilar rocks of science, from the study of which we infer that matter assumes the forms of animals and plants without the aid or influence of vitality.

"All organic life," says Mulder, "is the result of molecular forces.

It is a law that nothing can be imported into the world. . . . Vital force is, therefore, not a principle, but a result."

Let us examine some of the modes of reproduction to ascertain if vitality may be transmitted to the offspring. A polyp buds like a plant, and that bud in time drops away and grows into a perfect polyp like the parent. The parent had a full share of vitality,—nothing more, nothing less; the offspring also had a full share. It could not have been transmitted, for the parent parted with nothing. Was it a special creation? Special creations are unknown. Another species of polyp divides itself into two parts, both of which grow into perfect polyps and lead independent lives. This process of self-division is known to all naturalists, but *what do they know* about a self-division of vitality? Has vitality anything to do with a species of star-fish that tumbles itself to pieces and falls through the meshes of a dredger's net to prevent being caught? What part does vitality play in that wonderful mode of reproduction called "parthenogenesis," or "alternations of generations," when the egg of a kind of jelly-fish hatches into a *planula*, and then becomes a *scyphistoma*, and then a *strobila*, and then breaks up into segments, each of which becomes a perfect jelly-fish? Is vitality a kind of spiritual existence pervading all space, from which every transformation, every reproduction of lost parts, and every new-born organism may obtain a supply?

Moleschott says, "A force not united to matter, but floating freely above it, is an idle conception. Nitrogen, carbon, oxygen, sulphur, and phosphorus possess their inherent qualities from eternity."

"Nothing in the world justifies us in assuming the existence *per se* of forces independent of the bodies from which they proceed, and upon which they act."—*Cotta.*

"No force can originate from nothing."—*Liebig.*

"An absolute nothing is not cogitable."—*Czolbe.*

"Fundamentally considered, there are neither forces nor matter. Both are merely abstractions, assumed from different points of view of things as they are. They supplement and presuppose each other. Separately, they do not exist."—*Dubois-Reymond.*

When this question was discussed by the American Dental Association at Chicago, in 1877, it was raised to the dignity of a theological question by Dr. Sprague, who said, "Vital force dominates all the physical forces wherever they manifest themselves throughout the entire domain of physiology. Hence, although chemical forces act, they act only in subservience to the demands of vital energy in all its behests. They can act in no other way, because they are subordinate to the special dominating force. . . . All the forces are dominated by the special vital force which comes from above."

This gives us an idea of a little deity for every organism, with a little power, a little caprice, and a little will, toying with it through life on the pretense of "meting out all its changes in great mercy," and then dying with it, or undergoing Pythagorean transmigration to repeat the farce in the next organism. Of what value is vitality to life if it does not accomplish what is claimed for it? How absurd to suppose a vital force "from above" placed in a living being to resist disease and untoward influences brought on by the action of the natural forces, which are also "from above"!

"A house divided against itself cannot stand."

A dental practitioner and writer of high standing brings this question back from theology to science by asserting that "vitality is one of the forces of nature." He also says that "the matter of an organized being may have in it chemical force, electrical force, and other forces, but until *vital force* is added none of the peculiar phenomena that attend life are witnessed."

According to this statement, vital force was added to the natural forces at or about the time the first organism came into existence, and the inference is that it was created at that time, or else had a co-existence with the other forces, but was not joined to them. We must now take the question back to theology and call the force a special creation, or make the significant inquiry, *What was the employment of vitality during the long ages before it brought the first animal or plant into existence?* Forces are never idle. Was all that time required for conception and the embryonic state before the animal and vegetable kingdoms could be born?

Dr. Büchner says, "*Force can neither be created nor destroyed*,—an axiom from which results the immortality of force, and the impossibility of its having a beginning or an end. . . . The cycle of matter sides as a necessary correlate with the cycle of force, and teaches that nothing is generated anew, that nothing disappears, and that the secret of nature lies in an eternal imminent cycle, in which cause and effect are connected without beginning or end. . . . *A force which is not manifested does not exist and cannot be taken into account in our reasoning*."

"All organic functions," says Miahle, "are effected by chemical processes, and a living being may be considered as a chemical laboratory in which actions are going on which, united, constitute life. . . . The functions of respiration, digestion, assimilation, and secretion are chemical operations. Chemistry alone is able to explain these important phenomena."

Lamarck says, "Life is purely a physical phenomenon. . . . All the phenomena of life depend on the mechanical, physical, and chemical causes which are inherent in the nature of matter itself."

If the above quotations are according to facts, no one will, probably, raise any serious objections to the following from well-known naturalists.

Dubois-Reymond says, "Those who preach the error of a vital power, *under any form or delusive disguise*, are, they may rest assured, heads which have never penetrated the gates of science."

Virchow says, "The old doctrine of a vital power is not merely erroneous, but a pure superstition, which cannot conceal its relationship with the doctrine of the devil, and the search after the philosopher's stone."

"The appeal to a vital force," says Vogt, "is merely a periphrasis of ignorance. It constitutes one of those back-doors—of which there are so many—in science, and which are the constant refuge of indolent minds who will not take the trouble to investigate what appears incomprehensible."

"It now never occurs to a physiologist," says Hoeckel, "to consider any of the vital phenomena as the result of a mysterious *vital force*, of an active power working for a definite purpose, standing outside of matter."

"Among those mystical notions," says Dr. Büchner, "which bring confusion into the investigations of natural science, and which are now rejected by exact observation, must be particularly mentioned the notion of what is called vital force. There is scarcely any assumption which has done so much harm to science as that of a particular organic force which was said to resist inorganic forces (gravity, affinity, light, electricity, magnetism), thus constituting exceptional laws, —a separate code,—a state in a state. . : . Science, fortunately, instead of yielding in this question to dynamical theorists, has carried off the victory by the accumulation of a mass of striking facts; so that the notion of a vital force is reduced to a walking shadow, and exists only in the brains of such individuals as have lagged behind in science. All those who have studied any branch of natural science touching the organic world agree now in regard to vital force, and the term itself has become so obnoxious that it is rarely used. . . . The doctrine of vital power is now a lost affair. However much the mystics may endeavor to inspire new life into this shadow; however much the metaphysicians cry out against the presumption of physiological materialism in discussing philosophical subjects; however much some individuals may point to undiscovered and obscure physiological questions,—all this cannot save vital force from a rapid and complete scientific death."

Shall we any longer disregard facts that indicate a potency in nature to accomplish all that is claimed for phenomenal vitality? Its "pervasive presence" may abide with a grain of corn forever without germination unless it be furnished with moisture and heat. Life is phenomenal also, and its continuance depends upon food and suitable environment. Take these away, and the "force of vitality" cannot prevent death. As long as we hold to this almost abandoned theory scientific men will scarcely regard us as fellow-laborers in the dissemination of physiological knowledge. It is hard for them to believe —they do not believe—that every piece of organized matter has had created for it, or has had transmitted to it, a deity dominating the forces that brought it into existence. As impurities in liquids are thrust aside in the process of crystallization, so may theories of ignorance and superstition be rejected in the crystallization of natural truths.

SCIENCE OF FILLING TEETH.

BY S. B. PALMER, M.D.S., SYRACUSE, N. Y.

It seems unfavorable for dental progress that so much time should be devoted to discussions upon the extremes of practice. This may be beneficial in a certain way; knowledge may be acquired respecting the comparative merits of each extreme, yet there is little gain to the student who desires to know the principles which underlie all successful practice. The late discussion of the "New Departure" is an illustration. The opponents offer nothing to help the operator who desires to more successfully cope with the common enemy, decay; science is ignored; no new principle is offered; thoroughness in operations and gold for fillings are the highest requirements. So far as this extreme can be made to meet the demands upon dentistry, the writer has no objection to it. This is the representative idea of dentistry; it embraces teachers, schools, and societies, and is supported by practitioners and patients upon the same exalted plane. Let this be (as it is, for all who are satisfied) the goal to strive for; but to insist that it shall be the only standard of excellence, that the electro-chemical theory is false, and that gold is preferable to other materials because it does not tarnish, is contrary to science and practical observation.

As one made responsible for teachings denominated the "electro-chemical theory," I feel it due to the profession that three points in this connection should be fairly and clearly understood, namely: the principles upon which the theory is founded; the result of their application in my own practice, and the cause for the late reaction against the doctrine. In giving this explanation, I do not present any claims for discoveries; I shall not attempt to teach science beyond an explanation of the subject under consideration, nor to answer the objections of opponents. Touching the latter, I may say that the first paper upon this subject by the writer, entitled "Chemical and Galvanic Action upon the Teeth," was read before the New York State

Dental Society in 1874. Other papers upon the same subject have followed annually. The doctrines set forth in these essays were not hasty conclusions, but the result of years of study and observation, in the endeavor to place operative dentistry upon a scientific foundation. Previous to the advent of the "New Departure," the discussions upon this theory gave promise of success; since that time the endeavor has been made to disprove the "New Departure" practice, and to prove the laws upon which it is founded false.

The relations each sustain to the whole are well understood by those associated in the "New Departure" movement. To save time, the reader is referred to an article in the August number of the Dental Cosmos entitled "The New Departure," which shows the writer's connection therewith.

The principles which I am desirous should be understood, are facts in science which every operator ought to know, to aid in securing more uniform results. These principles allow a wide range in the choice of materials to accomplish the one object, *saving teeth.* Possessing this knowledge, it becomes the duty of the operator, as a professional man, to do for his patient that which under the circumstances will best meet the demands.

It is my purpose to show the working of these principles as I understand them. My friend, Dr. Flagg, has given *his* practice (not "New Departure" practice), demonstrating the efficiency of these theories for preservation, and going to an extent which few will choose to follow. Between this extreme and that so strongly advocated in opposition, probably lies the true practice for the greatest good.

Because of the assertion that the doctrine advocated by me abrogates the use of gold, I will again repeat that this *never* was a "New Departure" claim. I take neither side in the controversy between the old and new extremes.

The following cases will fairly illustrate my ideas, and show the application of the principles in practice. Each case will be reviewed, giving scientific reasons for variations. With one exception, the patients alluded to will represent the better class, demanding superior operations. The exception gives the treatment of a case quite the opposite,—a patient discharged since the commencement of this communication.

Case I. Adult patient. Teeth in fair condition, of average density, well filled with gold. Filling in central incisor shows signs of defect. On removal of gold, dentine sensitive. Treatment.—Excavated thoroughly, introduced phosphate of lime, removed all visible portions of lime, dried as usual, and filled with gold. Cavity in crown of molar not sensitive or deep; used oil of cloves; after drying cavity, filled with non-cohesive gold for foundation. In short, this case simply illustrates the majority of operations in which effective manipulation insures success, nothing more being required. Any preparation of gold, any method of operating, would be good in such a case, which would answer the requirement of excluding moisture; bad, in proportion as they fail in this particular. In this class of operations all that has been claimed for thoroughness is necessary; without it, success is uncertain.

Case II. A regular patient, treated recently. A lady, age about thirty-eight; first came to the office four years ago; teeth frail, several having been extracted; had been in good hands from childhood. Central incisors filled with gold, the approximate cavities enlarging around the fillings; *had already been filled four times.* Removed fillings; dentine soft and sensitive; cavities extending near the pulps; enamel of right central broken away on labial surface; the left still firm, though the walls are exceedingly thin and transparent. Treatment.—Removed all softened bone from the margins of the cavities, but not over the pulps; also the dark stains from enamel. Filled with gutta-percha. Refilled once or twice with same material, except in the cavity broken away on the outer surface, which was last filled with Agate cement. Condition at last sitting,—cavities not enlarged, dentine firm and free from sensitiveness. Indicated treatment for next sitting,—one to be filled with gold, the other with Agate cement, for the following reasons: the right central, which is broken away, will be improved by a gold filling, since the friction from brushing wears away the plastic fillings, while the left central cannot be filled, by any packing of gold, sufficiently tight to exclude moisture without breaking the enamel, while in its present condition the enamel will protect the plastic filling and the filling preserve the tooth.

Case III. Regular patient. Miss ——; age, eleven or twelve years; an invalid; teeth badly decayed and irregular; patient timid. Six cavities were filled in the approximate surfaces of the superior incisors with gutta-percha in 1876. The arch was subsequently expanded, which gave opportunity to refill. Used the same material. The condition of the patient having improved, an examination last April indicated that two of the six cavities could be securely filled with gold, which was done. Probably others at this time may be treated in like manner.

Case IV. Of a class where gold has to be used even under protest. This class includes those of defective tissue called chalky; teeth of children; others with devitalized pulps; those poorly calcified and endangered by fissures. Prepare cavities with all possible care; line such portions as would be most liable to decay with one or more thicknesses of tin foil; then insert gold fillings as usual.

Thus far I have given my treatment for teeth representing what is termed first-class practice. Upon the same theory we take a patient at the other extreme.

Case V. Patient a lady, aged eighteen or twenty; teeth naturally poor; except for extracting purposes, had never occupied a dental chair. An examination showed ten cavities to be filled, nine of which, under more prosperous circumstances, could be preserved with gold; six only were so filled. The cavity for which this case is noted was in right second inferior molar, on buccal surface, extending from cervical wall to center of crown; large and deep; the pulp protected by the organic substance of the dentine; color, dark brown. Treatment.—Excavated the margins to firm borders; cut the decalcified central portion into a convex covering for a pulp-cap; in filling, covered the cap with a thin shaving of gutta-percha moistened upon the under surface with oil of cloves, and filled with Standard Alloy, and from past experience pronounced the operation a success.

In these operations there is nothing new that I am aware of, either in the preparation of cavities or the mechanical manipulation of filling material. Indeed, I did not think it important to describe the operation. Others operate in like manner and are rewarded with equal success. This knowledge may be acquired in colleges, by clinics, or in the office. Experience is necessary in order to diagnose correctly and to be able to render a scientific reason for this varying practice. Under the following general canon we will review each class, to find, if possible, a particular law by which to anticipate results. Our confidence in natural laws rests upon the fact that *under the same circumstances, and with the same substances, the same effects always result from the same causes.*

Case I. This class of teeth embraces all those sufficiently dense or calcified to promise success in filling with gold. The office of such fillings is simply one of displacement—the corroding moisture is excluded by the solid filling. Without moisture, chemical action or decay cannot progress. Success in this class of fillings depends upon perfection, or, as stated, thoroughness of operation. This is particularly true respecting gold, and I hope to make plain the difference between gold and other materials. All agree that decay of the teeth is a chemical process and the result of fluid agency. Whether this action results in the formation of cavities or in dissolution of the tooth surface depends upon the following conditions, which have been overlooked by some who have experimented with teeth and fillings in order to prove or disprove the statement or assertion that gold accelerates decay. Having failed to produce cavities, they have given the results of the experiment as proof against the doctrine. I will briefly give the conditions: Teeth affected upon the surface manifesting sensitiveness from exposed dentine at the necks. This is produced by an acid condition of the fluids, which dissolve the lime of the tooth. Acid fluids of the mouth cannot produce cavities in teeth, in or out of the mouth, and yet the experiments alluded to were made with acid solutions. When we comprehend the principles of action in the oral cavity, and make the experiment in the laboratory accordingly, there is always an agreement. If we put a tooth in acid, we expect to see the surface attacked. Why does not the acid penetrate the weaker portions and form cavities? Because in places most depressed the fluid becomes weakened by combination with lime, and there being no circulation by which to add a fresh supply of the fluid, dissolution is retarded. Surfaces are affected by direct acid action; cavities are formed by reaction of an alkali, or in water by contact with a positive *electrode*. Experiments in this direction have already been given in a preceding paper. We are to look for cavities in teeth none the less because the saliva is normal. The retention of the fluids in any fissure or depression, or by lodgment of food, soon furnishes an agent to dissolve the mineral constituents of dentine. This we will consider to be the condition of teeth requiring fillings. There are three methods by which decay may be arrested: 1st, by obliterating the cavity so as to give free circulation of fluids; 2d, by the introduction of antacids; 3d, by excluding the fluids.

As a rule, gold properly manipulated into a filling will preserve all teeth included in the first class. The degrees less than perfection will determine the percentage of success. As this is in accordance with the results of the best practice of the day, there can be no serious objection to the statement.

Case II. Illustrates a class of teeth familiar to every operator,—those so defective in structure that gold is *not the best material* to use in their preservation. It is desired that the reader may have a correct idea of what is here meant, so that the charge that gold is *abrogated* may not be repeated. Moisture is an element in a living tooth; the proportion that it sustains to the tooth-substance determines in a measure the density or porosity of the tooth. An excess, as in the case cited, where some of the teeth had been filled four times, defies all thoroughness with gold. Leaky teeth, as well as leaky fillings, often disgrace an operator. It may be in two years, or five, or ten, but *failure rests upon a principle.* Decay progresses in a cavity according to the chemical properties of the fluid and the facilities offered for circulation, which furnishes fresh supplies. This is apparent in cavities before filling; small ones do not progress with the rapidity of larger, for the reason that the corroding properties of the fluid become weakened by union with the tooth-structure, while the organic matter of the dentine offers resistance to the circulation. Let us see the effect produced by moisture in a small fissure between a gold filling and the walls of the cavity, or upon a defective tooth, recognized as chalky. The moisture in these cases does not remain in the same condition as if the filling was of gutta-percha, or the dentine of greater density. The external fluid, in both cases, is in contact with the vital or natural fluid of the tooth. *Thermal changes* in a filling alter the electrical condition of the fluid beneath it in about the same degree as they affect sensitive or soft dentine. *These* are necessarily much modified in degree by a *non-conducting* filling. This is not all; gold is a good conductor of the electric current. The office which the filling performs in this connection I desire, most earnestly, shall be understood. Without the presence of filling, we have the tooth composed of elements some of which are soluble in acids. While the general surface of the tooth is bathed in *neutral* fluids, a cavity retains a portion, which becomes acid; as before stated, this acts slowly or rapidly in proportion to the opportunity for its renewal. A filling is introduced; moisture intervenes (no matter from what cause) around or at some point about the filling. The metal, as has been stated by objectors, is not acted upon by the fluid; neither is platinum or carbon, when used in batteries. The gold becomes a conductor and a negative element, and thus disintegration of tooth-tissue, which in case of a non-conducting filling would be very feeble, by this addition becomes vigorous. The gold acting as a conductor on one side, and the organic substance of the tooth being upon the other, the interposing fluid, both by galvanic and thermal action, becomes chemically changed or decomposed, thus constantly furnishing an opportunity for the renewal of the exciting fluid which dissolves the lime-salts from the tooth. The lesson we should learn from this is, *not to attempt too much.* We cannot set aside natural laws. Gold imperfectly manipulated is a poor filling in a good tooth, however well introduced; for a filling in a tooth containing an excess of moisture it is unsuitable.

Case III. Introduces a young patient, with poor constitution; teeth frail and badly decayed. Parents would prefer gold, when it can be used safely; for reasons already given, gutta-percha was used. The condition at present shows marked improvement; two cavities are already filled with gold, with fair prospects that the others may be safely filled in like manner hereafter.

Case IV. Teeth not essentially different from the last mentioned; the filling, however, to be gold, even at a risk. Line the cavity with tin or some metal that will be attacked, and fill with gold in the usual manner. As to any objection on account of galvanic action produced by this union, I have not time now to answer by giving the laws which govern in this connection, but will simply state *conclusions* which at any time I will willingly scientifically substantiate. 1st. There can be no galvanic action between the two metals so closely in contact as to exclude moisture. All chemical change is limited to the surface. 2d. A tooth so filled with metal as to admit moisture is a battery, acting under the same laws that govern the same combination of materials in the laboratory. The metal is a conductor and negative element; the organic substance of the dentine is also a conductor and positive element. Decomposition of the fluid furnishes the acid to dissolve the mineral or lime constituents of the tooth. 3d. The laws of constancy govern the action of a battery. When a strong and continuous current is desired, platinum or carbon is used for the negative elements, and the zinc is amalgamated to protect it from deposits upon its surface, which, if allowed, destroys its action. In filling a tooth with gold subject to moisture the action is constant, but with a filling of any other metal usually employed, *liable to be attacked*, the organic surface of the cavity, which answers to the zinc of a battery, becomes filled or coated with the metallic salt, thus forming an insoluble compound, electrically so in harmony with the filling itself that little or no chemical action ensues. So far as I have observed, all teeth that can be filled with gold perfectly—that is, where the dentine is dense enough to *promise success* with gold—if filled with base metal, do not discolor deeper than the mere surface; those so defective as to fail with gold are the ones to be discolored by base metals.

In closing, I give the reason for leaving a pulp capped with the organic substance of dentine. First, it is better adjusted to the form and conditions of the pulp than any artificial substance could be. Second, when the external fluids are excluded, all subsequent moisture will be neutral or non-irritating; and, third, without external moisture decay cannot progress.

With this explanation of the "electro-chemical" theory I leave the matter with the reader. Notwithstanding all that is said against the doctrine, for the purpose of exploding the "New Departure," improvement of, and not injury to, "accepted dentistry" is my highest motive. From this standpoint, I would say to any, not committed to either extreme, Be not in haste to offer opinions not supported by observation or actual knowledge. The question is one to be settled by science. It seems to meet the opposition common to all scientific innovations on established thought and practice. Operative dentistry is to be modified and improved by the teachings which science offers. It is lamentable that any attempt should be made to close the only avenues through which this knowledge can safely reach the profession. If the introduction of the new practice was premature and damaging, the declaration of its fallacy and failure is also premature and injurious. Operative dentistry in America leads the world. It would be a calamity to lessen its standard of excellence. To say that it cannot be improved, is to stay progress, and put it on trial against science and an enlightened public. For the sake of harmony and the good name of American dentistry, may this never come to pass.

THE "NEW DEPARTURE."—WHAT IT "BELIEVES" AND WHAT IT "CONTENDS."

BY HENRY S. CHASE, D.D.S., M.D., ST. LOUIS.

In proportion as teeth need saving, gold is the worst material to use for filling them.

In proportion as teeth are defective in organization or calcification, gold is the worst material to fill them with.

In proportion as teeth are bathed in acidulous saliva, gold is the worst material to put in them.

In proportion as patients are neglectful of their teeth, gold is the worst filling to have in them.

In proportion to the excessive use of acidulous beverages by persons having filled teeth, gold is the most dangerous filling there.

In proportion as teeth require large fillings, gold is the most dangerous metal to use.

In proportion as teeth are broken down, or have thin walls to their cavities, gold is the least useful for their preservation.

In proportion as teeth are decayed on their proximate surfaces, gold is the most dangerous of metals to fill them with.

It is often said of the "New Departure" that "its theories may be true *out of the mouth*, but that they are not practically true *in* the mouth."

We contend that ordinary observation of the action of various fillings *in* the mouth most emphatically confirms the disputed theory.

We contend that metals having the best conducting power—electrically—are the least preservative of dentos.

We contend that experiments in the mouth supplement, with entire harmony, experiments that have been made out of the mouth.

We contend that the practice of nine-tenths of the dental profession is based on the secret belief that a gold filling will not preserve a badly-decayed tooth as well as an amalgam filling.

We contend that the present practice of the dental profession is based on the *beauty* of a filling instead of its *usefulness.*

We contend that gutta-percha, tin, and amalgams all have a more favorable showing in the same mouth than gold has, so far as preservation of the teeth is concerned.

We contend that the most reputable operators fail to make as desirable operations with gold in proximate cavities as poorer (?) operators do with plastic materials under the same conditions.

We contend that it is not honorable for a dentist to subject a patient to a long and tedious operation, in order to produce results far inferior in usefulness to a short, simple, and easy operation.

We contend that it is the duty of every dentist to welcome the truth, however disagreeable it may be, and let consequences take care of themselves.

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson, M.D.

Operation for radical cure of epithelioma.—The case now before you, gentlemen, is one of great interest, inasmuch as it stands the representative of a direction of practice with which you will necessarily have much to do. I say "necessarily," because, whether you be dentists or oral surgeons, epithelial troubles will force you to a facing of them. Not that as dentists you will have to treat epitheliomata, yet, let you limit your practice as you may, it is compulsory on you to know the expressions, if for no other reason than that you may know when, where, and how to sound an alarm.

The epitheliomata are not necessarily cancer, but cancer does often enough show itself in the form of epithelioma. It is a mistake commonly fatal to the patient to confound epithelioma of cancerous character with epithelioma of other origin.

In presenting for the consideration of the class this subject of epithelioma, I think I speak judiciously in offering the term as expressive of a class of diseases rather than as designative of a special and peculiar disease. I think in this way for various reasons: first, it is not uncommon to find surgeons who never use the word epithelioma in connection with surface cancer; second, it is not less common to meet practitioners who group the most innocent of cancroids with the most malignant of lupoids; third, the skin surface, and more particularly the oral mucous surface, afford ulcers and tumors of common likeness, while of various character.

The case before you is one of epithelioma wherein the cancer vice is expressed. If you ask me how that is known, I answer by referring you to the peculiar-looking fungiferous giant granulations which cover the face of the ulcer. Again, I answer by telling you that the patient has been able to find no cure for her trouble, even although most skillful men have treated the case. Comparing these granulations with those studding the soft palate of the gentleman from Arkansas, whom you saw at our last clinic, you will remark the common likeness. The case of the patient from Arkansas was undoubtedly cancer, although it had been sent to me with a diagnosis of syphilis; this present case is also cancer, and no treatment for any other disease will apply for its cure,—just as, in the case referred to, antisyphilitics had been found lacking in efficiency.

No two conditions are more apt to be confounded than syphilis and cancer, particularly as the manifestations of these diseases present upon the surfaces. I see examples of such confusion every month or week of my life. I cannot, however, accept such confusion as excusable. There are many and wide differences between cancer and syphilis. In the first place, the latter disease has a history in the individual cases; the former is without a history. The local manifestations of syphilis are multiple; cancerous epithelioma is single. Syphilitic granulations are not specially hemorrhagic; cancerous proliferations are peculiarly so. Pain in syphilitic ulcer or tumor is dull or entirely absent; in carcinoma it is sharp and never wanting. Syphilis is a disease most commonly met with in the young adult; cancer is seldom encountered before middle life.

The disease, in the case before us, commenced in the form of an insignificant-seeming scab; a scab giving no thought of anxiety, and which was picked away as accident brought it under notice of the fingers. In this same way come a multitude of these cancers. A man notices a little roughness about the free border of his lip, which roughness he brushes off without giving the matter a thought. The roughness comes back, however. After a time what is picked away is seen to be a scab; upon the lip is an ulcer; in the ulcer is a malignancy that refuses to succumb to ordinary treatment. It is now, not unlikely for the first time, that the attention of the patient is aroused; caustic is applied,—lightly, perhaps, and if lightly, almost certainly fatally.

It is not after such manner, however, that cancerous epithelium always makes its appearance. When it shows in the skin it is apt to be in the form of wart or of induration. Upon a border associated both with skin and mucous surface, it may appear either as tumor or as ulcer; sometimes it is a pedunculated growth; it may show itself first as an infiltration.

Epithelioma of cancerous nature differs little in its histological character from scirrhoma; practically it differs not at all. Both are apt to kill sooner or later. If, after cutting away the growth in the present case, we should expose a section of it to the magnifying power of the microscope, we should find certain characteristics thought to be designative of the cancer expression. For example, cells would be found in abundance, these, not unlike the common or epithelial cells, being nucleated and scale-like. It would be seen, however, that these cells have departed and are continuing to depart from the normal epithelial expression; that they are over-prolific in nuclei; that there is over-vascularity, and that there are signs of oily degeneration. In a word, that the evolution does not correspond with natural evolution.

Whether cancer is a constitutional or a local disease, is a most important question to decide. The English school says it is the first, and that the local expression is merely an outlook of that which is in the blood. The German school says the reverse of this, and teaches its students to look upon the local disease as on a something purely primary. The difference is great; the difference makes all the difference in the world in the way of treatment. "When doctors disagree, who shall decide?" The difference, however, gentlemen, is a difference without a difference. What do we know of the real nature of the cancer vice? Nothing. What do we know of an antidote to the vice? Nothing. What, indeed, do we know scientifically about the subject? Nothing—nothing at all. It is because we know nothing about it, that every year thousands upon thousands of human beings are being carried out of the world by this dread scourge.

You see, gentlemen, it is a difference without a difference. When the knife or caustic fails the surgeon, a child is not more helpless in the presence of a case than is he. Yet is the helplessness not in means but in the doctors. I have no more doubt that I have had under my eye, time and time again, the specific for cancer than I am in doubt as to addressing the class at this moment. But seeing I have not seen. All human eyes have, up to this time, been found too myopic to discover the wished-for remedy. The profession in this respect are like to readers of printed but not published books; readers of which the number is legion.

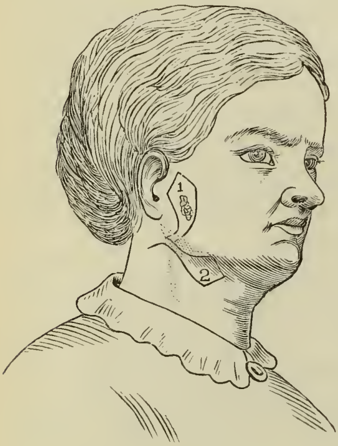
Some of you will be thinking that if the German school be right, a free and early use of the knife affords great prospects of cure. It is on such conclusion that practice in this direction is based. Unfortunately, however, the cancer cell is too often elsewhere than where it seems to be; a section made in operation does not secure it.

To-day I show you a manner of operating which in my experience gives the patient the best chance for life; indeed, I am coming to place more and more reliance in the efficacy of the means, for out of quite a number of cases where I have found myself able to practice the method, the time now extending over seven years, I have knowledge of but a single instance where a relapse has been experienced. This result, if anything aside from mere accident, is wonderful.

The cancer before us, you see, is situated in front of the ear, and overlies the parotid gland. What I propose to do is to remove the morbid mass, and to transfer to the place of the removed part healthy tissue from a region so far distant as the anterior part of the neck. If such operation fails, I know of nothing better to do.

Already, gentlemen, you have seen me perform the operation, at least in principle. Each case, however, is a study in itself. It is one thing to replace a nose, another to make over a cheek, still another to replace an amputated lip. In the present instance we have to decide not only how we are to get away the cancer, but, most important, how we are to re-cover the exposed gland.

With a lead pencil I draw my lines of excision about the diseased part . . . It will appear to you, I think, that I may conclude these lines to be well outside any straying cells (lines shown in diagram, 1). Now for a flap of replacement . . . This outline meets the want (diagram, 2). . . . The lady being now profoundly under the influence of ether, I proceed to dissect out the part included within the lines first drawn. . . . This gush of blood is from the temporal artery; we have not, however, exposed the parotid gland; the cut into the vessel has been made beyond where it emerges from the gland. We shall, indeed, be unfortunate if our knife so much as snips a single lobule of the gland. Exposure of a lobule would threaten us, as you know, with a salivary fistule . . . The operation is certainly bloody . . . Expect blood whenever you operate for cancer. Hemorrhage implies cut vessels; cut vessels imply ligatures. Wherever there is cancer, there, too, is superabundance of things that bleed.



We are not to overlook the parotid fascia. You do not forget that this is simply an envelope in which the cervical fascia has inclosed the gland. If we are to have pus as the result of our operation, we certainly want such pus on the outside of this fascia. . . . Remark, gentlemen, that the exposed surface has glazed; glazing is what promises most. Always in plastic operations try to get glazed surfaces. . . . We now proceed to dissect up the flap of replacement. As I shall have to cut the external jugular vein, I will have a finger placed in pressure upon that vessel, so that no danger may arise from entrance of air into the circulation. Never cut a large vein without taking such precaution. Air in the circulation commonly means death on the operating-table. . . . Now our flap is up; the pedicle, as you see, is below the ear. Where the cancer was I lay the part of the flap which a few moments back was on the neck, just below the chin. . . . To fix this flap in place, I begin with a few stitches of the interrupted suture, and after such manner I close the lines of both wounds. . . . Now I have finished. There remains, however, as you see, a small triangular space not filled on the neck; this space is very small. We will allow it to fill up by granulation, or, if when I get this patient in bed I can manage to prevail on her to allow me to bind the head to the arm for a few days I will completely close it by the use of sutures. See, that this is easy of accomplishment, I show you when I incline the head forward; with very little strain I make the skin cover the wound.

* * * * * * * * *

Some two hours after the conclusion of the operation, a hemorrhage occurred beneath the flap, which compelled the unclosing of the wound and the ligating of several minor vessels. Dr. Garretson remarked that this was the very first time in his life hat he had to undo a wound from such a cause.

The subsequent progress of the case was quite as good as could be hoped for. The scar, which is not important, is lessening daily.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular Meeting, November 19th, 1878.

(Continued from page 98.)

The following paper on "Prevention of Decay," by C. A. Marvin, D.D.S., of Brooklyn, N. Y., was read by the author:

It is a trite remark among dental speakers, when discussing questions in operative dentistry, that the highest aim of our profession should be not the cure, but the prevention of decay; and that he who is a successful operator in this regard has attained a degree of eminence far above that of the most accomplished introducer of contour fillings. Just here opens a wide field of thought, and a mere glance over it discovers many interesting questions, such as, How far preventive skill would be availed of? How its value could be made to be appreciated by an unscientific public? How its competency and its fruits could be made to realize proper compensation? with others of kindred character.

The introduction of such questions and the manner in which they are framed would seem to imply the entire absence of preventive skill now, which is somewhat more than is intended. There is some, but not as much as there should be; nay, there is not much. There is some application of it, with just enough of fruits to inspire the wish that there were more of this skill, and that it might be formulated and made an element of orthodox dental practice. There is not enough of it, nor are the modes in which it is applied uniform enough to make these questions unnecessary or improper. Uniform? Why, there is not uniformity enough in these modes to indicate an identity of opinion in those who adopt them. Each dentist, each club of dentists, each society, each college is a law unto itself.

The special consideration of the questions which I have suggested as likely to arise out of this large field of thought is not, however, the purpose of this paper, and enough having been said to show the propriety of their being put, I pass on in the direction I propose to pursue. Possibly the point of discordant methods may be touched in the course of the projected examination.

"An ounce of prevention is worth a pound of cure" must be my text in discussing the topic which heads this paper.

Indeed, this maxim, old as it is, though none the less potent because aged, should be the golden rule of practice for every conscientious dentist. He works, or should work, on this principle in all his operations. This assertion does not justify a narrow interpretation nor a partial application of the maxim. It contemplates the fair, unbiased reception and use of its truth. Let us not be unmindful of this. In accepting any of these summaries of truth (time-honored maxims) as guides of action, petty prejudices should be laid aside and the mind thrown open for the entrance and influence of the truth as it is taught therein, else we may as well discard it at the outset and save trouble.

Let me make myself clear. If one quote a maxim containing a general principle, which everybody accepts, in support of his pet mode of applying it, which many reject, it is an unfair use of the maxim. For instance, a dentist whose whole thought is directed to diet as the only means of securing sound teeth, while descanting learnedly upon his favorite theory, urges its adoption by the entire profession, "for," he exclaims, "what says the old proverb? 'An ounce of prevention is worth a pound of cure.'" No one doubts that this is the language of the proverb, nor the principle contained therein, but as to whether his is the proper "ounce" there may be some difference of opinion. It is a style of argument somewhat popular, but specious and necessarily weak.

The dentist is usually applied to for *remedial* services. Not until some lesion in the dental organs is perceived or feared, is the dentist called upon. For purely preventive treatment, the time has now passed, and what he does is chiefly remedial.

Let us not quarrel over terms. I have introduced the last two sentences for the very purpose of forestalling controversy by making this distinction.

Our terms are to a degree *relative*, and we may as well understand that at the outset. This must necessarily be so, because of the fact stated, that not until some lesion in the dental organs is suspected or perceived is the dentist called on.

Purely preventive treatment must begin far back, antedating birth, conception, marriage. In the girlhood of the yet future mother, the instructions should be given which, if followed, will secure uniform physical development, perfect nervous balance, a healthy circulation, good digestion—in a word, robust health. This is the time for, and this *is* preventive treatment. It consists of nutritious diet, regularity of habits, exercise in the open air,—such exercise as employs all the machinery of the human frame, as walking, horseback-riding, rowing; a style of dress which does not hinder the free action of the internal organs, which does not distort the body nor weigh unduly upon the abdomen, nor overclothe one part leaving another unprotected; regular and consistent habits of thought; the cultivation of equability of temper; sufficient sleep at the proper hours for sleep.

Such habits of life, many of which I know are unfashionable, will prepare a woman to transmit to the children she may bring into the world an inheritance of health of incalculable value and permanent duration.

But not only do the future mothers of children need such instruction; young men need it also. Excesses in youth plant seeds of weakness and disease which bear terrible fruit in mature manhood, and are bequeathed by fathers to children with sad certainty. Were it not that evidences of the unwelcome inheritance are seen in the organs which come into our hands for treatment, this particular thought need not have been introduced in a dental paper. The fact existing,—cases illustrating and proving its truth coming under the eye of dentists frequently,—its introduction in this paper is eminently proper.

Much of this purely preventive service may be done by the dentist if he is true to his high duty and alive to the interests of his race. Wise suggestions to mothers of young daughters, to young women themselves, will accomplish much. Great judgment will be necessary in doing this kind of work, that delicacy be not offended and the dentist called an intermeddler. No man has a right to offend the delicacy of any woman, nor does the powerful shield of professional privilege protect from just censure the man who assumes such a right.

Physicians may be and often are obliged to do what is very trying to the delicacy of their patients, but when done under the stress of necessity and with propriety of demeanor, no offense is taken. Nor should there be. So dentists can perform just such extremely delicate service as has been indicated and have it kindly, gratefully received. It is a kind of service almost wholly neglected. Few dentists are qualified to do it, and fewer still are courageous enough to undertake it.

Now, it may be said that such advice to children, especially to girls, should come from parents, or, if from any other, from the family physician. If parents will do it, well; but as a rule, they are not informed on such subjects. If their attention is called to the bad condition of their children's teeth, they simply remark, "Yes, my children inherit bad teeth from me," without a thought of the possibility of preventing a recurrence of the evil in the next generation.

If it is conceded that the physician may with propriety so instruct young people, then may the dentist, for I maintain that the family dentist should sustain as confidential relations to his families, in things pertaining to his specialty, as does the physician in his general practice. If this doctrine were generally accepted (happily it is to some extent) by the profession and the public, a new and mighty influence for higher attainment would at once be put in operation.

All dentists should be qualified to sustain such relations to their patients, and to perform such service. Just here a searching question might be put, *What proportion of the practicing dentists of to-day are so qualified?*

As this question is pondered, the necessity of a more thorough education of students of the useful and arduous and exacting profession of dentistry is clearly seen; for it will be at once admitted that we can never have a profession equal to the high demands upon it till such an education is insisted on; till well-rounded men issue from the educational institutions of dentistry; till diplomas mean what they are supposed to mean; till college degrees invariably speak the truth, and they who own them shall have earned them, and can justly be proud of them, and are entitled to the honor they are intended to confer, and can take an equal place among the learned in other professions and among the scientific and thoroughly furnished men of their generation. To avoid misinterpretation, let me repeat what was stated in an earlier stage of this discussion, that if these remarks are taken to mean that men of this high class are totally wanting, such an inference is beyond the intention of this paper. There are some such men, but we need more.

If a student *will*, he may acquire a good foundation of instruction in dental schools. But suppose he is indifferent, is he put to such a test as a thoroughly furnished mind only can endure? And does he find that indifference to study or a mistaken estimate of his ability insures failure? Are the hundreds who are let loose upon the community from our dental colleges, year by year, competent men? Are they men who are capable of adorning the profession? Are they men of culture, men of thought, men who appreciate the value of discoveries which their predecessors have made, and able in many things to begin where *they* stopped, thus making each generation an advancing one in the line of true progress? If so, well and good. If not, they ought to be, and should be required to be. Is this smilingly dubbed an Utopian idea? Then let us who are convinced of its soundness pray and labor that our land may speedily become Utopia, and our age an Utopian age! Let us so exercise ourselves that one of these ends shall be realized, viz., *the more thorough equipment of practitioners of our specialty.* Not an equipment of glittering instruments, fine furniture, and costly surroundings; these money can buy and an ignoramus can own; but a mental equipment, well chosen and complete,—this much is not unattainable. It may possibly reduce the number of graduates, it will quite likely diminish the number of students. For a higher and severer test at the end of a college course will necessitate a better foundation of general knowledge at the beginning; and they who are unable to express their thoughts in grammatical language, or to make a proper choice of letters in spelling the words they wish to use, will hardly feel encouraged to apply for admission to a college to pursue a course of professional study. Just in this respect there is need of reform, for it is absurd to see young men received to a course of scientific instruction whose common education is not up to the standard of a district school. And yet this is seen in some of our dental colleges. Now, this can and should be corrected.

When this end (the higher education of dental students) is attained, the other (the instruction of patients) is sure to follow in its time. For a man who is thoroughly informed himself, when he sees the want of the information he can give, cannot refrain from giving it. He must speak. Silence is intolerable, for he deems it ungenerous. Good suggestions will flow out of such a man's mouth almost involuntarily, clothed with such an air of sincerity and in words of such earnestness as will command attention and work good.

This good time is coming, and bright will his name be on the page of dental history, whosoever he be, who aids in ushering in its dawning.

This branch of my subject is of so absorbing interest that it is difficult to leave it. But I must pass to other points.

A thorough, exhaustive examination of these two correlated ideas could not fail to be of great benefit to us all:

Purely preventive treatment: its elements; when and how to be applied; and

The necessity of every dental practitioner's being fully qualified to administer it.

Let me now invite attention as I apply the subject to the practice of to-day.

It has already been said that the dentist is usually applied to for remedial services, and yet in close alliance to these are services which are appropriately termed preventive. Here is an opportunity for the exercise of good judgment,—for judgment which is based upon knowledge. And it is but one instance out of many which illustrate the truth that fully-equipped men only can prepare the profession to meet the demands upon it.

An important question is to be decided. What kind of remedial service is to be rendered? And immediately following upon this comes another equally important. What shall be done in the way of preventive treatment? In other words, how shall the present ills be cured and how shall others be averted? Indeed, these two questions are so intimately connected that a wise decision of the first necessarily involves a careful consideration of the second. It is not enough to pronounce judgment for extraction or for filling as a cure for the present ill. The dentist's thought must not be limited by so narrow a boundary. The present ill must be cured, it is true, but in its treatment reference must also be had to the future.

There is probably no profession which calls for so many and varied decisions by its practitioners as dentistry. The assertion, I am aware, will call a smile to the faces of those unacquainted with the details of our practice.

The remark has been made to the writer, "What can you find in a tooth to talk an hour about?" It is supposed by many intelligent people that all there is of dentistry is the extraction of teeth and the cleansing and shaping of cavities and filling them with gold or some other material; that if anything more belongs to it, it must of necessity be charlatanry,—making unnecessary cavities or doing unrequired service.

But we know better than this, and we are pleased to believe that a large proportion of the public know better than this.

Now, in support of the claim just made for our profession as regards numerous and varied decisions, let me cite a single example, a case of "toothache," the patient calls it. He may or may not express a wish as to the kind of operation to be performed, but is clamorous for relief.

The dentist examines the case and puts himself through the following catechism: Can this tooth be saved? Is it an important tooth?

Is the service which it will be likely to render sufficient to justify the treatment necessary to its preservation?

These questions affect the tooth itself independently of the others. But questions of equal moment arise out of the relation of the sick tooth to the others.

Would its removal affect them? Would this effect be advantageous or disastrous?

There will be instances where a tooth, judged independently, would be condemned at once to the forceps; but in consideration of its relation to the remaining ones, will be treated and retained at great trouble and expense.

There will be instances where a tooth presents no serious difficulties to conservation, but which is removed solely because the community of which it is a member is judged to be better without it.

There will be instances where the offending tooth, though needing much treatment and requiring large additions of artificial substance, will be retained and another less defective removed.

Here truly is presented a wide field for decisions—so wide that it is not surprising that decisions should be varied. Neither is any portion of this field a mere airy creation. It is all real, practical, and has been often traversed.

Now, let it be observed that the decisions arrived at are so varied because of the relation between the present and the future condition of the cases considered,—that is, the future welfare of the teeth is carefully studied and the effect upon it of each suggested operation well prejudged before radical treatment is undertaken. In other words, it is attempted to make the treatment preventive as well as remedial.

If it be decided to save the tooth, the operation for that purpose bears principally upon the future. The present relief experienced from having a large cavity or a broken crown made strong and smooth is something, but that relief must become an uninterrupted and permanent experience to make the case a success. The future is to be provided for,—its exactions of this mended organ are to be thought of; the destructive agents which will attack it, the dangerous influences which will beset it, must all be anticipated and thwarted in advance.

And here I will briefly allude to one or two theories I hold which are connected with the operation of filling teeth, and which would properly be considered in a paper on that special subject, though none the less pertinent to the topic which is before us in this essay,—none the less pertinent because they affect the prevention of renewed decay.

In finishing crown fillings in the grinding surface of molars it is better to make them concave than flat or rounding, that particles of food or acid fluids may not lodge at the wall of the cavity, which is the vulnerable point, but glide over that line and rest, if anywhere, in the little basin of the filling.

When fillings are inserted in the proximate surfaces of teeth,—bicuspids and molars notably,—the teeth having been separated for that purpose, if the operations are so done that the teeth are allowed to come together again, tooth-substance touching tooth-substance, a renewal of decay is certain. It matters not whether the point or points of contact be at the cervical walls, at the lateral walls, or the grinding-end walls, the result is one. The prevention of decay in such cases requires one of two modes of operation, as distinct from each other as the poles. One consists in cutting away so much of the teeth that they cannot get together, and filling the sides so cut with flat fillings. This insures the prevention of renewed decay, but is objected to for several reasons. It breaks up the continuity of the masticating surface. It leaves wide spaces between the teeth for the uncomfortable accumulation of food during eating. It exposes the gum borders to injury from the same exercise. It renders uncertain the continuance of a tooth in the particular position it occupied when it was operated on. Given over to its own sweet will, it may move forward or backward or rotate till an unsightly effect is produced. It involves a great waste of valuable tooth-structure. The other method consists of removing so much of the buccal and lingual walls of the cavity as will allow the swell of the filling to project beyond them laterally when the original ovality of the tooth is restored, and then so finishing it that, when the teeth approach each other, the rounded gold side of one shall touch the rounded gold side of its neighbor, closing the space completely, and allowing no tooth-substance in one to come in contact with any tooth-substance in the other. This method prevents the recurrence of decay, and leaves no ground for the objections before specified. A much higher degree of skill, however, is requisite for the successful performance of such operations, but this fact should work no determent to men engaged in any scientific pursuit.

In filling the lateral surfaces of these same teeth, where the cavity extends so far toward the end of the tooth that the grinding end wall is quite thin, and the fissure between the cusps is at all defective, the only certain mode of securing *prevention* is to cut out the fissure to its extremity, cut down the thin end wall of the lateral cavity, and make of both one continuous canal for one knee-shaped solid filling.

I now pass on to consider another division of this subject, and the one in which the domain of the topic may quite properly be said to lie, viz., prevention of decay in young people's teeth.

By "young people" I mean all who have not ceased to grow,—the framework of whose bodies has not yet attained its growth.

Pre-natal service has already been considered. This is to be rendered to the parents for the benefit of the children. But this is prospective in large measure. The age past was not wise in this direction. Parents of a half or a quarter century ago had no thought that any responsibility as to the character of their unborn children's teeth rested with them. They ate, they drank, they married and were given in marriage, solely for their own pleasure. Perhaps it may be so in time to come. So that we have, as a natural result, children with defective teeth. And it is our duty as dentists to take care of them and prevent or arrest decay.

I have three points to consider, viz.:

1st. The treatment of the mouth during the eruption of the permanent teeth.

2d. The treatment of mouths in which the teeth are very much crowded.

3d. The treatment of irregularities.

Each of these in its relation to the subject under consideration, viz., the prevention of decay.

1st. Treatment of the mouth during the eruption of the permanent teeth.

It is generally held to be good doctrine that the deciduous teeth should be retained in the mouth till their successors, the permanent ones, appear; and as thus abstractly recited, the doctrine is undoubtedly sound. The process of nature, when unhindered, needs only to be watched to learn so much. The deciduous teeth erupt, attain their size, do their work, become loose, and fall out to give place to the firmer, stronger ones that are to attend man through his chewing days. When these milk-teeth fall, instead of long roots which it was supposed they had, lo, there is seen only a ragged-edged base and no root at all. Now, it is a fact that the deciduous teeth in their fullest development have proportionally longer roots than the permanent ones. Where are they? Absorbed. The pressure upon them of the growing permanent germs causes absorption. Two results are thus attained. The obstacle, which is the deciduous root, is removed out of the way of its ambitious successor; and an irritation is kept up by means of this pressure, which facilitates the process of development.

Remove the milk-tooth while yet its root is of full length, unpushed by its supplanter, and the eruption of the latter is checked and often delayed for months. Why? The healthful excitement so greatly conducive to its growth is wanting. It is by antagonism we advance. In indolence we stagnate if not retrograde. The principle runs through nature.

But this normal process may by some means be interrupted or prevented, and a corresponding departure from standard treatment be necessary to counteract the evils which such interruption or perversion would cause. In such a case our so-called "sound doctrine" would be very bad doctrine, and the effect of its application pernicious.

From some cause to us unknown the new tooth may be turned from its normal course, and when discovered may point without or within the proper circle. If this state of things is not corrected, a wide departure from propriety will ensue. The erupting crown of any of the twelve front teeth, in shape a wedge with its base downwards (inwards), presents its inclined surface to and impinges upon the inclined surface of the root of the occupying tooth, it also being in shape a wedge with its base upwards (outwards), and the inevitable result is a growing displacement.

Or the permanent sixth-year molar and permanent first bicuspid on either side of either jaw may develop to a full size while yet the temporary molar remains firm, and be so shaped and inclined as to overhang, before and behind, this shorter temporary molar, thus locking it in its position firmly. The new second bicuspid coming up to succeed it, makes its way in the track of the dissolving roots of the temporary molar till it reaches the gum margin where it meets the obstructing wedged crown, which will neither dissolve nor dislodge, when it either remains undeveloped or shoots off in a wrong direction, causing deformity and injury. This is a condition often overlooked. To correct it, the wedged crown of the temporary molar must at once be removed. Again, a careful examination of the mouth during the period of eruption of the permanent teeth may lead the wise dentist to the conclusion that the upper and lower dental arches, when sufficiently expanded to bear a symmetrical relation to the framework of the other features, will not accommodate all the teeth which will naturally erupt therein; in other words, that if all the permanent teeth are allowed to take their places, the jaws will be so expanded as to cause disproportion in the feature,—the mouth. He will see also, mentally, a crowded arch, teeth forced out of line, contacting surfaces decayed, and an endless need of the dentist's remedial services. This, it may be objected, is too much for a dentist to foresee. I think not. He is supposed to understand the normal development of the region he is educated to treat. He should know, when looking at the nose, cheek-bones, chin, what sort of a mouth properly belongs to them. And having closely observed the processes of nature, he should be able to tell what is likely to be the extent of maxillary and alveolar development; how much space for teeth there is likely to be in a normally-developed alveolar ridge. Now, when the first permanent teeth appear, a fair judgment can be formed as to the size of the entire set, and the conclusion quite safely reached whether they will have sufficient room. If it is concluded that they will not, then the future welfare of that mouth requires that certain teeth be sacrificed. The next question is, which shall they be? While allowing that varying circumstances may vary the decision of this question, I would say, as a general rule, the sixth-year molars. "And why?" queries my sharp reviewer. I will state why. For several reasons:

1st. They are usually the least durable teeth in the mouth.

2d. If extracted before the second molars erupt, the teeth forward of them will naturally fall back slightly, thus gaining relief from lateral pressure, and the second molars, as they develop, will come gradually forward into the places thus made vacant, closing up all space and making an unbroken masticating surface.

3d. Room being thus provided at the ends of the alveolar ridge, the dentes sapientiæ can erupt more easily, more regularly, less painfully, and in positions wherein their usefulness will be greatly increased.

Two other frequent conditions of the teeth during this period demand notice. (1) When the primary teeth have become seriously decayed and the pulps are exposed, and (2) when the pulps have died and abscesses are imminent or have already formed at their roots. In the first-named cases, great caution is to be exercised. One result must certainly be attained, viz., the use of the tooth *without pain*, and this for the two reasons plainly apparent in the statement—first, that the child may properly masticate nutritious food, and second, that he be relieved from suffering. His health is promoted by either of them.

Now, how shall this end best be reached, and due regard be had to the welfare of the second teeth?

I answer, if the pulp-exposure be slight, of recent occurrence, the cavity accessible, the tooth healthy, the child of average or higher physical vigor, capping the pulp and filling the cavity will be likely to meet the wants of the case. If the conditions are otherwise and unfavorable, devitalization and extirpation, followed by filling, constitute the only reliable treatment.

This treatment, of course, is not at all new, and is given here only because it supplements the decision by the dentist that it is important to retain these teeth in the mouth.

If, however, the crown of such a tooth is much broken down and the pulp-exposure large; if this has taken place at so early an age that the roots are probably incompletely formed, extraction is clearly indicated.

In the second class of cases, where the pulps are already dead and incipient, or mature abscesses exist, what is to be done?

If the crown is sufficiently strong to promise service, and the abscess near the surface, so that its puncture as often as may be necessary is easy and painless, the tooth may be retained, cleansed, and sometimes filled. If the abscess be deep-seated and the pus disposed to burrow into the body of the maxilla, the tooth should be removed. A slight contraction, or, more correctly speaking, a reduced expansion of the maxillary bone, is preferable to its possibly necessary excision, or to an external fistula and its consequent,—a permanent, unsightly cicatrix. Another view of this class of cases embraces the question of the effect upon the erupting permanent teeth of abscessed temporary ones. As there is much diversity of opinion on this subject, and little data to reason from, I offer the society only the conclusions of a thinking man.

A diseased or uncleanly person is not a desirable elbow companion at table or in bed. One's appetite may be spoiled, one's stomach turned, or one's sleep destroyed as a result of such companionship. Let either of these results be continued, and loss of health will inevitably ensue. Remove the cause, that is, dismiss the offensive companion, and the appetite will return, the stomach consent to retain its contents, the drowsy god will resume his sway, and everything be at peace again. Upon examination the organs will be found to have sustained no injury, and the period of sickness is soon forgotten or remembered only as a nightmare.

A diseased tooth in the mouth is not conducive to the comfort of its neighbors, nor promotive of vigor in any of the tissues or organs with which it is intimately or remotely connected. In addition to the acute pain which proceeds from itself, its general effects are distressing, and organs never suspected of being feeble or unsound participate in the distress.

Such a condition of things continued would make a serious inroad upon health; but let the cause be removed and these ills subside and comfort is again established. Now, when the new teeth appear in the very places which the offenders once occupied, there is nothing, so far as my observation has taught me, to show that they have been organically affected or in any way weakened by the improper behavior of their predecessors.

The safety symptom in such cases is the pain. Children do not conceal their sufferings, and when a diseased temporary tooth has destroyed sleep and rendered eating impossible for a few days, recourse is usually had to a dental or medical adviser, the difficulty is detected, and effectual remedial treatment applied. And this is done before permanent injury is wrought to the new organs or contiguous tissues.

The next point to be considered is the treatment of crowded mouths. Mouths in which all the permanent teeth have not yet erupted have already been considered under the former head. I speak now of such as come into our hands with all the teeth, except perhaps the dentes sapientiæ, fully developed and crowded tightly together.

If left in this condition, caries is sure sooner or later to attack the contacting sides, making much difficult filling necessary.

How shall such decay be prevented?

In two ways: First, if the teeth are strong, with thick, dense enamel, shaving the proximate surfaces with a thin, sharp chisel, from one side of the mouth to the other, will relieve the injurious lateral pressure and greatly lessen the liability to decay. This operation needs to be carefully performed. It takes much time, much patient labor. Sufficient must be taken off that an actual separation shall exist, while the roundness of the tooth must be preserved, and the surfaces polished perfectly. Otherwise, this operation is a positive damage and will invite decay.

The second method of treating crowded mouths is to take out of the instrument case a pair of forceps, and with a calm, settled purpose and a firm hand, remove from one to four teeth. Which teeth? If all are equally good, *the second bicuspids*; if the first molars are very defective, and the dentes sapientiæ not yet erupted or just coming, then the *first or sixth-year molars*—in the first instance, the second bicuspids, because, although among the most beautiful teeth of the set, they are small, and their removal, while giving sufficient room, will not give too much, and besides this, when the spaces which their removal causes are filled up, as they soon will be, this absence is not noticed by an unprofessional eye, owing to the fact of the molars next behind being, like them, provided with cusps presenting a somewhat similar appearance; in the second instance, *the sixth-year molars*, because of their defective condition, and the fact that their loss will be soon unnoticed in the changed position of the second and third molars.

Similar considerations surround this question to those already specified under a former head. It is not necessary to repeat them.

The last point with the brief allusion to which your already wearied patience is for a few moments to be taxed, is *the treatment of irregularities* with reference to the prevention of decay. Of course I shall not go into the general subject of "treatment of irregularities." I shall simply touch upon a phase of it, and confine my remarks to this special field. Yet, I am aware that some sharp mind will at once advance the query, Is there any treatment of any irregularity which does not affect to a greater or less extent the durability and usefulness of the teeth? To avoid discussion at this period, I will concede the point in general and proceed to allude to some specific effects of specific forms of irregularity and their prevention.

The lapping of teeth, one upon another laterally, is very productive of decay. The friction of two enamel surfaces in contact injuriously affects both, and the length of time before decay will commence depends on circumstances, such as the density of the enamel, the health of the patient, the peculiar diathesis which he manifests, etc. It is, however, only a question of time. Come it will. A speedy and complete separation of such teeth is positively indicated as the preventive treatment. Not only so, but their insured permanent separation is a necessary part of the required treatment.

Again, by just so much as the teeth vary from an orderly arrangement, presenting a broken outline, by just so much are they rendered more difficult of cleansing, and cleansing is necessary to their preservation. Food will lodge on the outside of such teeth as stand within the circle, and in the spaces betweeen them and the adjacent ones, which will escape the stroke of a brush, unless it is applied with more care than is usually observed in this exercise. Uncleanliness, decomposition of the lodged food, diseased gums, and weakened teeth follow as the result. Or, if the owner of such a crooked set of teeth be very particular as to cleanliness, such a severe use of the brush must be resorted to that mechanical injury will be done to the facial surfaces of those teeth which stand prominently outside the line and receive the full force of the furious strokes. In the desperate, daily struggle with the enemy, uncleanliness, deep grooves will be worn in these prominent surfaces and permanent evil wrought.

In these, not imaginary, untoward effects of irregularity is perceived another unerring indication of necessary preventive treatment, and a proof that such operations as will bring the teeth into correct line do constitute the mode in which it should be administered.

Again, where such irregularity exists that but few of the teeth in one jaw meet and antagonize with their opposites in the other, the result is a reduced masticating surface and a corresponding imperfection in the mastication of food. This condition of things leads to indigestion, and the indignant stomach retaliates by affecting the secretions of the mouth, and these in turn injuriously affect the teeth which they flood and envelop.

The soundness of the teeth, therefore, as well as the general health is promoted by such treatment as will supply a more effective masticating machine and insure thorough comminution of the food, which is so essential to its perfect insalivation before it passes into the stomach.

While the instances cited are doubtless sufficient to show the relation between irregularity and injury, and the necessity of a correction of the first in order to prevent the second, a few words on another phase of the subject are requisite to give completeness to our consideration. We are considering the treatment of irregularities with special reference to the prevention of decay.

Obviously, then, it becomes our first duty to avoid creating the evil we are aiming to correct. Is it ever done? Yes, too often. What are termed *heroic* modes of operation are sometimes resorted to, with injurious effect upon the organ operated on and upon the general nervous system of the patient.

An injudicious *application* of force will produce sad results by causing disease and decay at the points which are made to receive the force, while the end sought to be attained is as far off as before.

Long-continued severe pressure, without recovering intervals, is hostile to the desired end. It keeps up irritation, allows the parts no opportunity to take on a reinforcement of strength for the strain, and weakens and damages in general, while it seems to be successful in particular. It requires mature judgment not to be deceived in such cases.

Too protracted treatment of cases of irregularity works injury. All the time necessary to its proper reduction should be taken, but not any more. It is to be remembered that wearing a mechanical appliance upon the teeth, especially in the tender period of childhood, is no benefit to them. It is likely to be a damage. Hence the *shortest* period of time such an appliance is worn the better. [This idea must be kept in the mind of the operator as well as that before noticed. One modifies the other, and both are true.] Hence, also, the *simplest* appliance that will meet the wants of the case should be employed. Care should be had, too, that as little wounding or irritation of the gums and soft parts should be produced as possible.

Time will not admit of further detail in this direction. Enough has been said to give food for thought, and he who thinks well upon this subject will find the field widening before him, and will see and avoid the multitude of mistakes so easily made in this branch of practice.

This is no task to intrust to the hands of a tyro,—of an assistant,—this work of correcting irregularities. It is one of the most difficult, most perplexing, most important parts of dental practice. It affects beauty, comfort, speech, health. Its results are life-lasting. It needs, therefore, the most matured judgment, the highest skill that can be availed of. It is a wrong inflicted upon himself, upon his patient, upon his profession, when a dentist turns over such cases into the undirected hands of the inexperienced. It is a wrong to the patient, for the best service is not done for him; to the dentist, for it implies a failure to appreciate the importance of the case; and to the profession, for it argues that ripe experience and cultivated judgment are worth no more than the agility of a novitiate's fingers, the freshness of a novitiate's opinion.

The subject we have been considering leads our thoughts into a vast field, wherein one could spend a lifetime.

How insignificant appear our powers when we bring them to the exploration of so vast a subject. How lofty its heights, how profound its depths, above and below our farthest reach. And yet this is but one of the many fields of investigation opened to us in the wide domain of dentistry. Is it too much, then, to say that a good education should be required of every candidate who presents himself at the doors of dentistry for admission and instruction in its mysteries? Can any man ever hope to meet the demands upon him without it? Can the profession maintain the high position which belongs to it unless its ranks are filled by such men? Never!

Discussion.

Dr. Wm. H. Dwinelle, of New York. The ideas in the paper we have just heard are such as we all sympathize with and can heartily indorse. It is undoubtedly true that our professional position with reference to our fellow-beings gives us the opportunity, the right, the duty to co-operate with the mothers of the land in insuring for future generations, through care of the dental organs, a more healthful and normal type of constitution than now exists; for it is certain that mankind has in many ways degenerated physically from the original type. It is our province and our duty, as far as in us lies, to correct to the fullest extent of our ability the errors of civilization. I think we have a higher claim than the physician to do this, because his relations with his patients are only for the hour, while ours look into the unlimited future. Dr. Marvin also claims that some standard of acquirements should be set up, to which all must attain who desire to enter our profession. This claim is pregnant with great truths and great consequences. We are rapidly falling short of our plain duty in this respect. Our dental colleges should be more careful than they are as to whom they admit within their walls as students. Some requirements should be made from applicants for matriculation other than that for their money. They should be required to have, at the very least, a good common-school education, and their character, ability, and general intelligence should be taken into account. The present standard (if it can be called so) is exceedingly and disgracefully low. As a result we are obliged to personally associate, in many cases, with men whom it would almost seem a disgrace to know; men whose abilities are hardly worth the word; men whose professional acts and operations do constitute, and will constitute (so long as they cling to us), a millstone on the neck of the profession. The present ignorance in dentistry—ignorance with which we are daily brought in contact, and which is awarded by the public, not to its individual possessors, but to the general profession—is mainly the result of lax conditions of admission to our colleges, and, as such, is disgraceful to us. On the whole, and even in the foremost ranks of dentistry, we see signs of retrogression. Witness the quickly-felt and (I am sorry to say) powerful influence of the doctrines only lately put forward under the name of the "New Departure." I hope and believe that this depression in professional feeling is only temporary; but we must not sit still apathetically in that hope or belief. It is our duty, now and always, to at once oppose any backward movement in dentistry. Let us remember, and try to live up to, the admirable motto of this society,—"*Semper urgens altior.*"

Dr. Wm. H. Atkinson, New York. If our profession were not in earnest, I should say nothing at this time; but I have the same interest in the profession that I have in humanity. There are men in it whom I love, but I cannot indorse them when they bring before us a rehash of things which are familiar to us all, and take positions which they cannot sustain. What has been said to-night that is of value? Dr. Allan's cases were certainly of use, because we can learn something from them. But if we are simply to applaud truisms because it is the fashion, what progress can we thus make? Will such self-glorification prevent teeth decaying? One gentleman intimated that we could coddle the ladies and have greater influence with them than physicians. That is the kind of statements which spring from the folly of thinking that dentists are not medical men. We are medical men, just so far as we administer to the needs of our patients. That personal pronoun—that big I of egotism—is the real millstone on our necks. We have no right to it. If we would ask to be led in the way of truth, if we would understand embryology, physiology, and the construction of the teeth, better than we do, we would be more worthy of the I than we are. I want to say something about our lack of ability to properly criticise the conduct of our colleges. What right have we to claim that a mere education from books will fit a man for dental practice? Why, when a patient presents himself, the very best dentists in the land, except one or two, begin the case at the wrong end! How many are careful to thoroughly clean the teeth at the first sitting? I have had patients from the very choicest men in the profession, and I know whereof I speak. The general course is, that a patient calls having some particular thing to be done, and that thing, and that alone, is attended to by the dentist, and the patient is then sent away, and the dentist feels no sense of further responsibility. My experience is, that in forty-eight out of every fifty mouths attended to by the best dentists, no attention is paid to the future condition of the teeth through cleaning, polishing between the teeth, and insuring that they are perfectly healthy. How are we to prevent this? By studying the embryological and histological characteristics of teeth, which will enable us properly to act and pronounce judgment. We should be putting teeth in such order that gold will be against gold and leave the teeth in a natural position, and so that food will not penetrate between them. It has been said that we should "claim" many things. I have heard a great deal about these "claims" in my life. The fact is, that when we *deserve* these things, the "claim" will be awarded without the asking. Let us *know* something of the organization of tissues and the normal method of development, and then we will have less "difference of opinion." Knowledge is better than opinions.

Dr. S. G. Perry. Does Dr. Atkinson consider it good practice to clean all mouths, young and old, as fast as they come into our hands?

Dr. Atkinson. Nature requires that Nasmyth's membrane be polished off. It is the neglect of this which causes a great deal of dental decay. This is what I mean by cleaning the teeth. Do it for the baby's teeth, and for the old person. Leave as finely polished a face everywhere on the enamel as you can.

Dr. Dwinelle. How about "Lo, the poor Indian"?

Dr. Atkinson. He does it by chewing hard foods.

Dr. Jarvie. The books tell us that Nasmyth's membrane is one of the most indestructible tissues of the body. If this is so, what is the necessity for the removal of the membrane?

Dr. Atkinson. That is a pronouncing of judgment to which we are not entitled. In the process of conversion of the embryonal elements into tooth-tissues by calcification, Nasmyth's membrane was left behind. I am confident that I can justify my views histologically. Polish the teeth, for all patients, at all ages, and all teeth which have Nasmyth's membrane on them.

Adjourned.

FIRST DISTRICT DENTAL SOCIETY.

Office Practice.

Dr. Mills. I have a case of interest which I will refer to. I don't think we come in contact with such cases very often. It has been considered for a long time that we could not have an abscess on a tooth with a living pulp. I have two cases in hand, one of which I have had for some time,—one a lady and the other a gentleman,—of an abscess formed on a part of the root, both being in the superior molar, and the pulp being alive.

Dr. Abbott. I had a case of a lower molar, where the pulp in the posterior root was alive, and at the anterior root there was an abscess discharging; and I cut away all the dead portion of the pulp that I could until I came to life, and capped that over, and it has been now quite a good many months in a good condition. I treated the abscess through the other root and cured that. That was in a young lady's mouth. I had another that was not quite so difficult; I capped it with oxychloride of zinc, and if a pulp was ever alive that was alive. I also have a case of a lateral incisor, where the tooth was broken off, and I amputated a portion of the pulp. When I saw the lady last the pulp was as much alive as ever it was.

I had a case of a little boy seven or eight years ago, with pulp exposed in the upper second molar, and very badly exposed, too, in that it was difficult to do much with it, but I managed to put a pellet of cotton over it saturated with creasote, filling in the sides and bridging over with Hill's stopping; and to my surprise, about two years after, the gutta-percha filling having been knocked out, I found the pulp as alive as ever. I capped it over again in the same manner exactly, and he has never had a particle of pain in it since. Nothing but creasote and a little pellet of cotton over it and bridged over with gutta-percha. Since that I have in several instances—having noticed the way this case worked—treated teeth in the same way for children, and I find that I can get along with them much better than I can with any other kind of capping, or anything else that I have ever seen or thought of doing. I have had several cases since that, and they are doing very nicely; but this struck me as a little peculiar because I had seen the pulp.

Dr. Odell. I want to *cap* that. I had a case, not long since, where a superior right first molar was split from angle to angle of the crown, the fracture going down through the root so as to expose the pulp, the pulp living. The gentleman came to me, hoping I could do something, but expecting to have it extracted. Well, my first thought was forceps, and my second thought was salvation. I accomplished the salvation in this way: I first tied up my tooth with floss-silk,—just wrapped it up as you have seen the ends of wine-casks hooped, hoops all the way along,—and after a week or so I found the pulp still living, and then I concluded that it would be worth while to try something else; so I took off my silk hoop, and put on a golden one,—platinum with solder over it, of course. I drove that down as though it were on a barrel; then I filled the cavity that was remaining, where it was fractured in the crown, and that tooth lasted two years all right. It was finally extracted with the pulp still alive. (There is a gentleman here who did the work, I believe,—Dr. Slocum.) The tooth was lost simply from accumulations of tartar. The hooping, while it saved the pulp alive, prevented the cleaning of the tooth. He was pretty tender of it and the tartar worked up, and it had to be extracted from that cause.

Dr. Tenison. I have a case on hand that is rather interesting. A gentleman, who has been a patient of mine for several years, was taken about four years ago with violent pain in his right ear. He was under his physician's care for some time, and could not get any relief. He was an active business man. After the pain in his ear had continued for some time, he began to feel a little tenderness in the lower second molar, and came to me to see if that could be the cause. He had no knowledge of any trouble there at all until nearly two weeks after he had experienced the pain in his ear. I examined the tooth, and found a small surface filling that had been put in some two or three years previously. The nerve was not at all exposed, and I told him that he had better take a dose of quinine and see what effect that would have, but being under the care of a homœopathic physician, he objected to do it. He went back to his physician, and I did not see him for several weeks, when he presented himself again, and he had a severe abscess under the angle of the jaw with a fistulous opening discharging. I concluded that the tooth was dead. This was a case in which I do not see how the pulp could possibly have been saved, and I lay this case before the society because of what followed. I found the pulp dead, and so announced to the gentleman. He was so uneasy about it, and so fearful of a recurrence of the abscess, that he insisted upon my extracting the tooth. I objected to it, and without my knowledge he had the tooth extracted. About two months ago he came back to me with a pain in his left ear. He suffered in that way for several days so much that he could not attend to his business. He complained of a little tenderness in the second inferior molar on that side. That tooth I had filled myself about five years before,—a good, thick layer of bone over the nerve,—and I could not understand why he had this trouble. I made applications of aconite and iodine, but they gave no relief, and the man was in agony the whole time. I concluded to remove that filling and drill into the tooth. I found that the nerve was slightly sensitive, and was evidently somewhat congested. I made an application and devitalized the pulp, and the patient had relief at once. That was about six weeks ago. I then put in a temporary gutta-percha filling, and he has had no trouble since. I propose in a little while to refill that tooth. Was there any other treatment that could have been adopted to relieve the patient and save the tooth alive? What seemed to me strange in this case was that on the right side the third molar had been extracted, and on the left side he still has the third molar; his trouble passed from that tooth into the second molar, and the third molar was entirely free from any pain, and the pulp is also alive.

Dr. Atkinson then read a paper entitled "To what shall we attribute the Failure to effect the Highest Good in Dental Practice?"

Professional men are divided into two classes, displayed in the prevailing methods or habits of performance of their special function. Each class claims to be governed by intelligence and honesty. The first gives attention to redemptive work, and never acts until the mischief has been effected to repair which they sedulously labor. The second arose out of observations of failures of the mere *redemptionists* that suggested the possibility of greater good to be hoped for by instituting a system of practice looking toward the prevention of the mischief, thereby excluding the necessity of redemption.

Probably no individual practitioner legitimately belongs exclusively to either class, and probably no one individual is so well informed and endowed as to include all that may be hoped for by persistent faithful exercise of both prophylactic and redemptive practice. We are usually very ready in finding excuses for our deficiencies, and shifting the responsibility from our shoulders to those of others, whether they be teachers, practitioners, or patients. Honesty demands at our hands the correction of every error that is not in its nature incorrigible so soon as it is discovered to be an error, either in doctrine or in practice.

All ability signifies intelligence, and all inability deficiency of knowledge. The most destructive example of inability is dishonesty, especially that form of ignorance which assumes that it is *impracticable* to be thoroughly honest. All the professional work that needs the excuse, "I guess that'll do," or "We'll have to make it go," is nothing short of dishonesty, and is dangerous to the growth of the practitioner, in view of its liability to become chronic. The very highest advice to pupil or practitioner consists in the instruction to carefully obey the dictates of conscience. In other words, when a case presents which you cannot diagnose, either seek counsel or wait for the development, when this can be done without jeopardizing the interest of the patient.

When you do not know what to do, do nothing, but wait.

Dentistry as a profession, although it originated from the deficiencies in general medicine and surgery, is still suffering from the lack of knowledge on the part of general practitioners, to whom we naturally look for direction in ambiguous cases complicated by diseases of tissues other than those belonging to the mouth. This the writer knows by a long succession of close observations of failures and successes in his own practice and that of his brethren.

Any teacher who is not enthused by a love of truth stronger than the desire for financial success is not amenable to her clearest revelations. We must not pervert the Scripture by seeking for the "things that are to be added" as the motive of our endeavor, instead of the right doing, which is the fulfillment of the requirements of truth.

Some of the most severe of the experiences of my life, as a teacher, have resulted from a knowledge of this very perversion by those dear to me, made known in various ways; one, so common as to have been the stimulus which prompted me to write this paper, is lack of thoroughness on the part of dentists to put each mouth under their care in complete order up to their highest ideal. So lamentably does this prevail, that the percentage of those not thus classifiable would fall below five. Dear pupils, whom I have carefully and anxiously taught, are continually making this mistake, and are always ready with what they esteem as sufficient excuse when I direct attention to the cases suffering from their neglect. Were this neglect confined to charlatans, the demand for reform in the "upper circles" of practice would not be called for. Truth demands that a testimony far from flattering be borne against the practice of some in high repute, who otherwise possess many valuable qualities. Almost nobody is fulfilling even his own highest ideal in the promptness, thoroughness, and completeness of work to be done in the mouths of even his most obedient and appreciative patients. I have at this time under treatment two notable cases of malpractice, occurring under the care of A No. 1 practitioners, as reputations go (one in Boston, the other in New York). One case had lost the attachment of the dental ligament and the free border of the alveolar process in every tooth of an entire set of beautiful teeth, above and below, and was suffering from an epuloid growth of a lobulated character on the labial surfaces of the gums of the upper front teeth, discharging pus from around the whole mass and between the lobules. Upon the removal of the fungous mass, the roots of the teeth were laid bare without any intervening alveolar process or connective tissue, these having been absorbed or converted into the morbid growth. The other case had submitted to the extraction of the right superior first bicuspid, in hopes of getting rid of an agonizing toothache, which had continued for several days and nights, rendering the patient fidgety, nervous, and almost unmanageable. The pain not having abated, the patient was sent by her father to me. Upon examination I found the pain to arise from suppuration of the outer horn of the pulp of the right superior second bicuspid, which had been filled four years previously with gold. The filling still remained in position. Above the filling decay had proceeded, exposing the pulp, and thus producing inflammation. The filling was removed, revealing a drop of pus, occupying the chamber of the horn above indicated, the removal of which set the patient almost wild. A drop of creasote and oil of cloves was placed upon the exposed portion of pulp without mitigating the pain. This was removed by bibulous paper and pure chloroform applied, giving such instant relief that the patient jumped out of the chair to make demonstration of her satisfaction. After this the pulp was protected by one of

Weston's metallic caps, and temporarily filled with gutta-percha. Further examination revealed a terrific example of *pyorrhea gingivitis* (flow of pus from the gums). The gums covering the entire alveolar border, or variable portion of the maxillæ (superior and inferior), were "raw as beef." The patient said she had not taken a comfortable meal for two years, and that she had been four years under the care of the same dentist. It is impossible to describe in words the appearance of this mouth. The entire roof from incisors to third molars was swollen and lobulated with tomato-like compartments of enlarged gums, discharging offensive pus as before stated. The fissures between these lobules were from one to four or five lines deep. By pressing the gums away from the teeth, fully one-half of the length of the roots was exposed. The case was put under the aromatic sulphuric acid treatment, and is doing as well as could be hoped for in the time (ten days) it has been in hand. In this same mouth a very large, loose gold filling occupied a ragged cavity, involving the grinding and anterior surfaces and the pulp-chamber. Upon the removal of this spongy mass of gold (which was anything but pleasant to the smell) pellets of cotton were exposed occupying the butt of the canals in the root. When the cotton was removed from the base of the anterior buccal root a ropy, inky fluid poured forth, which surprised me. The patient remarked that the tooth was relieved from a sense of pressure which had been felt there for a long time. A professional brother from the West being in the office at the time, I called his attention to the inky appearance of the exuding fluid, when he promptly attributed the dark color to the presence of some iron instrument, which had been broken off and left there, having been converted into the sulphide of iron, and mixing with the discharge, gave the inky appearance. This had been my previous opinion.

These and similar examples call loudly for a new deal in study, in teaching, and in practice; call loudly for more honesty, more thoroughness, more patient, persistent, and faithful loyalty to our highest ideal.

Dr. C. E. Latimer. I wish to protest against adopting the statements of patients about these matters. It is absurd to think that any first-class dentist should have a patient over whom he had charge or supervision with teeth in the condition of either one of these just described; it is too ridiculous for us to think of for a moment. No such cases exist even among the meanest practitioners of dentistry. I don't care how low a man may be in the profession, if he had uniform charge of a set of teeth he would have them in better condition.

We have all heard patients tell about certain operations having been performed, and we all know how ridiculous the statements even of very intelligent patients are. They say how such a tooth was treated, and that the filling was put in the next day. If it is one of our own cases we turn to our record, and find that instead of the next day it was, perhaps, a month before the filling was put in; and yet the patients may be honest in their statements. Now, I want to enter my protest against bringing the statements of patients about other parties into societies of this kind,—statements of patients which would be prejudicial to the reputation of dentists. I do not believe what my own patients say about my own operations, though I believe they are talking honestly to me to the best of their recollection, unless my books verify their statement, and I am very careful not to allow my mind to be prejudiced against a fellow-practitioner through statements that any patient may make to me. I know they are so often mistaken, that I do not want to believe anything unkind or uncharitable of a practitioner, merely from statements of a patient. I just mention this to dispel the aspersion upon the character of first-class practitioners in Boston and New York. With all due respect to Dr. Atkinson, I know just how patients talk.

Dr. Atkinson. I will simply reply to that, that my statements were religiously true and can be testified to. All that I have said can be verified to the last extent, and the individuals can be produced. I do not say this for any other purpose than to awaken the profession to the importance of faithfulness and thoroughness, and to the injury that these half-hour appointments and short sittings are doing,—a practice that is really destroying the value of our body to the world.

Dr. Richmond, a dentist from San Francisco, exhibited some models of artificial crowns and pivots, and explained his method of pivoting.*

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The first regular meeting of the Odontological Society of Pennsylvania was held on Saturday evening, February 1st, 1879, at the office of Dr. C. J. Essig, 1533 Locust St., Philadelphia. The following officers were elected:

President.—Daniel Neall.
Vice-President.—F. M. Dixon.
Recording Secretary.—Ambler Tees.
Corresponding Secretary.—M. H. Webb.
Treasurer.—E. H. Neall.
Librarian.—W. G. A. Bonwill.
Executive Committee.—C. J. Essig, E. T. Darby, and Louis Jack.

The object of this society is the diffusion of the principles and the development of the best modes of practice in the art and science of dentistry, and, if found practicable, to aid in the establishment of an independent journal devoted to the interests of dental science.

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* The description which follows would not be understood without illustrative cuts, and is therefore omitted.—Editor of Dental Cosmos.

To be eligible for *active* membership, a dentist must be in practice in the State of Pennsylvania and a graduate in dentistry or in medicine, and must have contributed at least one original paper to the published literature of the profession, or have made some other addition to its science or art. *Associate* members must be practitioners of dentistry, and graduates in dentistry or in medicine. The meetings are to be held at the offices or residences of the members.

AMBLER TEES, *Recording Secretary.*

AMERICAN ACADEMY OF DENTAL SCIENCE.

THE annual address before the American Academy of Dental Science was delivered October 30th, 1878, by Charles W. Eliot, LL.D., President of Harvard University. Subject, "The Defects Apparent in the American System of Dental Education."

The fact that dentistry had existed as a distinct calling in the United States for only about seventy years, and had within that time developed as it appears to-day, was considered as a remarkable exhibition of progress. Certainly we can afford a charitable judgment of whatever imperfections in its organization and in its practical workings may yet be found; for the progress of dental science in this country has not only been extraordinarily rapid, but, all things considered, very satisfactory. Among the causes for its rapid growth may be considered the inventive genius of Americans and the hospitality of the American mind to novelties, and largely to the need for dental service as a consequence of the soft, unphosphatic food on which Americans are accustomed to subsist. Americans, knowing the frailty of their teeth, visit the dentist twice or more yearly to know if any operative interference is necessary to *prevent* decay, while an Englishman never consults a dentist unless he has the toothache. Mr. Eliot alluded to the constant increase in the number of dental practitioners as well as of patients; to the increase of periodical literature and of standard works on dentistry, and especially to the increase in the organized means of dental education; to the growing desire in the profession for an improvement in professional status, and for an advance in the standard of dental education, for the accomplishment of which the chief reliance must be upon the institutions which undertake to educate dental students.

American dental schools demand no preliminary examination, while those of England require several university examinations. This simple fact will in time result in the superiority of English dentists. President Eliot urged the necessity for a course of three years instead of two; the discontinuance of the recognition of five years of practice as an equivalent for any portion of the period of study, and the deposit of a certificate of private instruction. The practitioner granting such certificate should also be required to show that he possessed the proper facilities for instruction. He thought the exclusion of unqualified men by any system of public registry such as obtains in other countries was not possible here, and that educated public opinion, and not legislation, must be looked to for a cure of the evil.

The speaker commented unfavorably on the recent action of several medical schools who have undertaken to confer both the dental and medical degrees after three courses, arguing that, as not more than three-fifths of the studies were in common, and as a three-years' course was absolutely necessary to the medical degree, therefore the two degrees could not be granted without lowering the standard of both.

While it is hardly to be looked for at present that a majority of dental students should be first thoroughly educated in medicine, and then in dentistry, yet constant effort should be directed to the improvement of dental schools.

At the close of the president's address, resolutions were adopted affirming the binding obligation of the code of ethics with reference to advertising, professional intercourse, etc.

Edward N. Harris, D.D.S.,
Corresponding Secretary.

EDITORIAL.

SPECIMEN NUMBER.

This number of the Dental Cosmos will be sent to every English-speaking dentist in the world whose name and address we have. As heretofore, we shall not send the Cosmos regularly to any except actual subscribers. Old subscribers who have not received the February number will understand that their subscriptions have expired, and will oblige us by forwarding their renewals at once.

Owing to an unusual accumulation of original contributions, we have added eight pages (making sixty-four) of reading matter to this issue.

We once more invite subscriptions from all who desire to avail themselves of the advantages of a first-class dental journal.

ANOTHER COINCIDENCE.

We inadvertently copied into the Periscopic Department of the February number of the Dental Cosmos an article, from the *Cincinnati Lancet and Clinic*, entitled "The Influence of the Nervous System on the Health of the Mouth," credited in that journal to Worthington Myers, A.M., M.D. The said article is *not exactly* a verbatim reproduction of a paper written by Dr. Jacob L. Williams of Boston, and published in the Dental Cosmos for December, 1872. Those interested can compare the two articles and see for themselves that there are just enough differences to prove that the recent publication could not have been from an electrotype of the first. The similarity may properly be called a curiosity in medical literature.

EXPLANATION.

In our review of "Hunter's Mechanical Dentistry," in the Dental Cosmos for January, writing of the chapter on Continuous-Gum Work, the following language was used: "In this connection the Fletcher gas-furnace is illustrated and alluded to as though it could be used in fusing the material, while in fact it is utterly valueless for this purpose." Mr. Fletcher writes: "The furnace works perfectly in places where the gas has a high heating power. I have seen scores of cases made in this furnace both in Warrington and in London and Liverpool, but it fails in other places where the gas has a lower power." Our criticism was based on a trial with Philadelphia gas. We cheerfully give Mr. Fletcher the benefit of the explanation.

BIBLIOGRAPHICAL.

Treatment and Prevention of Decay of the Teeth. By Robert Arthur, M.D., D.D.S. Second edition, with fifty illustrations. J. B. Lippincott & Co., Philadelphia, 1879.

More than seven years have elapsed since the issue of the first edition of Dr. Arthur's treatise devoted to an explanation of his theory and the details of his method in the prevention and arrest of decay of the teeth, especially of their proximate surfaces—a theory and method now too well known to need description.

Since the publication of the first edition of the volume before us the views therein expressed have been subjected to criticism; have been adopted in whole by some, in part by others, and rejected by many. His directions have been followed according to the intelligence or skill of the operator, more or less closely, and too frequently the "system" has been condemned when the fault lay in the want of appreciation or want of manipulative ability on the part of the dentist. While much puerile comment has been indulged in with reference to Dr. Arthur's suggestions, the crucial test of experience has demonstrated some valid objections to their adoption. The most important of these are: 1st. Morbid sensitiveness of the dentine as a result of excision of caries of the proximate surfaces. 2d. Irritation and inflammation of gum as a result of separation. 3d. The occurrence of caries after it has been removed by excision and the affected teeth permanently separated.

Dr. Arthur has not been inattentive to the utterances of his professional brethren, nor to the lessons of experience. That these have tended somewhat to modify his views is apparent in the later suggestions of the new edition of his work. He admits the force of the objections above alluded to, although he attributes the unfavorable results indicated in a great measure to a misapplication of the plan of treatment he has proposed, or to delay in putting it into practice. He admits, however, that such results do occur, and that there is a defect in the form of the separations he has advised, and although he has applied the system with very successful results, yet in certain details it requires modification.

In the endeavor to make out clearly the conditions upon which dental caries depends, as having an important bearing upon the whole subject, Dr. Arthur has carefully reinvestigated the first manifestations of caries of the proximate surfaces. He claims that caries does not first attack the most prominent parts of contiguous surfaces, but that it occurs in the close interstices near this portion. He believes that if caries is discovered while it is still confined to the surface of the enamel, it may be effectually averted by its resection, and by an enlargement of the close interstices in which caries of the proximate surfaces, according to his view, invariably commences. But he considers it essential to the best success, that the separations should be changed from the wedge-shaped form, and when it can be avoided should not be carried through to the gum. He describes in detail, with illustrations, such changes in the form of the separations as he deems essential.

These modifications, it must be understood, are only of the details, and not by any means of the general principles involved; the author claiming that a very extended application of the system, affording ample opportunities of observing the results of the practice, has given him no reason to change his views as to the basal principles, while the modifications alluded to, as described and illustrated in the new edition, will, he believes, remove all objections of any weight.

Dr. Arthur's position will not be disputed, "that in civilized communities, at the present time, caries of the proximate surfaces of the teeth is so nearly universal that the exceptions are inconsiderable." In regard to his method of treatment of the incisor teeth, Dr. Arthur's testimony is as follows: "So generally is this treatment successful, that I have come to consider a filling in the front teeth as inexcusable on the part of a dentist who has had the unrestricted care of a patient from childhood. There may be exceptional cases, but they are very rare."

Dr. Arthur has been for now nearly twenty years pursuing the system advocated in this work, and gathering the facts which have determined his conclusions. An intelligent observer, an earnest worker, a conscientious operator, his statements, his arguments, and his conclusions are entitled to and should receive careful examination and consideration.

MEDICAL CHEMISTRY, INCLUDING THE OUTLINES OF ORGANIC AND PHYSIOLOGICAL CHEMISTRY, BASED IN PART UPON RICHE'S MANUEL DE CHIMIE. By C. GILBERT WHEELER, Professor of Chemistry in the University of Chicago, etc. Philadelphia: Lindsay & Blakiston; Chicago, S. J. Wheeler, 1879.

Professor Wheeler is the author of several elementary treatises on scientific subjects. In the volume before us he has added another, which evinces a growing ambition. The general plan of the work is excellent, but the manner in which its details are carried out is frequently defective. As a manual of organic chemistry it is not concise enough for the student, nor full enough for the expert, while the frequent introduction of pharmaceutical and physiological discussion —in no respect essential, if not absolutely irrelevant—weaken and detract from its value.

Such remarks as follow can hardly be considered as very instructive in a work of this character: "Oxalic acid acts powerfully upon the system." "Poisoning by digitalin has often been produced through imprudence." "It is remarkable that the instinct of man should have led him to select, as the bases of common beverages, just the four or five plants which out of many thousands are the only ones, as far as we know, containing caffeine." "Shoe-leather may be rendered waterproof by greasing." Such information is scarcely new enough to justify its introduction into a volume devoted to the atomic formulæ of the acids, alkaloids, and aldehyds.

The disputed point of the antagonism of morphia and atropia is peremptorily settled by the author. In writing of the latter alkaloid and its congeners, he says, "No antidote is known for these poisons."

The portion of the work devoted to animal chemistry, although by far the most valuable and containing much interesting matter, is open to the objection of being a melange of elementary facts with others which could be of use only to the most advanced experimental physiologist.

We suggest that in a future edition the book be thoroughly revised, purged of its irrelevant and elementary portions, condensed in some and elaborated in other particulars, so as to make it of more service to the inquirer into the chemistry of organic life.

NAVAL HYGIENE. By JOSEPH WILSON, M.D., Medical Director U. S. Navy. Second edition, with colored lithographs, etc. Philadelphia: Lindsay & Blakiston, 1879.

A considerable portion—say one half—of this volume is devoted to a consideration of the art of preserving health on shipboard. The dress, food, clothing, and habits of seamen; diet, transportation and preservation of food, ventilation, discipline, etc., are carefully and intelligently discussed. Malarial and eruptive fevers, scurvy and syphilis, sea-sickness and home-sickness are also treated of more or less—generally less—intelligently. Cholera infantum, milk-sickness, goitre, and cretinism are also considered, probably because their extreme rarity on shipboard would find the average naval surgeon unprepared to treat them without accurate description of their distinguishing characteristics.

It would take more space than we can spare to indicate the subjects discussed in the other half of the volume, but they include a consideration of a large portion of the animal and vegetable kingdoms, interspersed with rambling, irrelevant, and not seldom nonsensical comments about—almost everything.

OBITUARY.

MR. HENRY SMALE.

MR. HENRY SMALE, of the firm of Smale Brothers, London, England, died on Saturday, January 11th, aged 64, of bronchitis, after an illness of only four days. He was senior member of the firm of Smale Brothers, dealers in dental supplies, and up to the time of his death took an interest in all that concerned the dental profession. He was widely known and highly respected as an honorable, genial, kindly gentleman. His unexpected decease will be deeply regretted.

PERISCOPE.

DIFFERENTIAL DIAGNOSIS BETWEEN EPITHELIOMA OF THE TONGUE AND TERTIARY SYPHILITIC GLOSSITIS, ACCORDING TO FOURNIER.—

Ulcerative lingual epithelioma.	*Ulcerative gumma of the tongue.*
1. Disease of adult age: maximum frequency between 50 and 70.	1. No particular age, but usually at a younger date than cancer.
2. Predisposing causes: hereditary cancer. No syphilitic antecedents (except by coincidence).	2. Syphilitic antecedents. No antecedent cancer (except by coincidence).
3. Frequent foregoing "lingual psoriasis."	3. No foregoing "lingual psoriasis."
4. History: appearance as a hard superficial node *externally;* then, more or less rapid surface ulceration. No opening or evacuation from the first of an abscess; no cavern.	4. History: appearance as a hard nodule *under* the surface, then sudden opening as of an abscess; temporary cavern, and soon after rapid ulceration, discovering the core of the tumor.
5. May occupy the inferior surface of the tongue.	5. Occurs exclusively on the dorsum and sides of the tongue; never on the inferior surface.
6. Lesion single and unilateral, with extremely rare exceptions.	6. Lesion sometimes multiple and bilateral.
7. Lesion, a tumor ulcerated on its surface.	7. Lesion, an ulcer, without a tumor in the strict sense.
8. Edges everted, with a raised border, unequal, irregular, excavated, etc.	8. Edges excavated deeply, sharply defined, adherent.
9. Surface bleeding spontaneously or on the slightest touch.	9. Bottom of ulcer shows a slough; no tendency to bleed.
10. Secretion abundant; in later stage fetid and ichorous.	10. Secretion slight and not ichorous.
11. Spontaneous lancinating pain in ulcer, sometimes darting towards ear.	11. Ulcer not spontaneously painful; no darting pains.
12. Functional troubles always marked (immovability of tongue, difficulty of speech, mastication, deglutition; salivation, etc.).	12. Functional troubles less marked than in cancer. Tongue not immovable, as in cancer, at least not to the same degree.
13. Lesion giving rise after a time to general symptoms of cachexia.	13. Lesion itself gives rise to no cachexia.
14. Microscopic examination shows the characters of epithelioma.	14. Microscopic examination shows the characteristics of degenerated gummy hyperplasia.
15. Ganglions affected after a certain time.	15. Ganglions intact.
16. Uninfluenced, or influenced unfavorably, by antisyphilitic treatment.	16. Antisyphilitic treatment beneficial.

—(*Jour. des Sci. Méd., from Lyon Méd.*)—*Philadelphia Medical Times.*

A NEW SYMPTOM OF IRRITATION OF THE FACIAL NERVE.—Dr. Leube describes (*Aertz. Intellig.-Blatt.*, No. 53) the case of a woman aged sixty-two, who had been suffering from spasmodic tic-douloureux for two or three months. It began with conjunctivitis, which was followed by blepharospasm; the spasm then spread over other branches of the facial nerve. The platysma myoid was the first muscle affected by the spasm; then followed the other muscles of the face. The spasms were so violent that the patient declared she felt as if her whole lower jaw were being torn away. At first, there was profuse salivation, but this gradually decreased. The spasms were clonic bilateral, and extended to all the muscles supplied by the facial nerves, specially to the orbicularis palpebrarum and the platysma myoides. The paroxysms followed in quick succession, but sometimes ceased altogether for several hours. When the paroxysm reached its climax the patient sometimes uttered a peculiar sibilant sound, which could be produced by drawing the soft palate upwards, at the same time contracting the uvula and performing expiration. It was, therefore, at once suspected that, even while the spasm lasted, the muscles of the palate were convulsively contracted. This supposition was verified by subsequent laryngoscopic examination during the spasm. If the tongue were slightly depressed, it was easily seen that, when the paroxysm was very violent, the palate, which until then had been apparently in a rather relaxed condition, suddenly was contracted and drawn upwards, and the uvula, contracting also, almost disappeared. Dr. Leube, therefore, supposes that the sibilant sound, as well as the spasmodic contraction of the palate, were due to the part which those branches of the facial nerve that supply the palate took in the spasm. It was not possible to prove whether those fibers of the facial nerve which stimulate the secretion of the saliva were also excited. The treatment consisted in giving Fowler's arsenical solution, either internally or hypodermically, and the results were most gratifying.—*British Medical Journal.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Will some one of long experience give me the most reliable treatment for relieving tenderness in the roots of teeth after the nerve paste has been used and the nerve extracted?—M.

A lady called to have me examine some gold fillings which had been inserted by another dentist. The fillings were very much discolored, but more particularly those in the left superior lateral posterior proximate, and left superior cuspid anterior proximate surfaces. I found these two fillings had not been separated, and that the one in the cuspid was slightly loose. I removed it and put in another gold filling, keeping it and the one in the lateral separate. I cleaned the filling in the lateral, and two or three others in the centrals, since which none of the fillings have become discolored. Will some one explain this?—R.

Why does not some one answer W. H. H., in August Dental Cosmos, 1878, in regard to the queer noises made at times by the condyloid processes in their articulations during mastication?—J. W. C.

Reply to W. H. W., who asks for a hint as to the best method to overcome the nausea caused by wearing a plate in the mouth. Make a perfect-fitting roofless plate. Do not let it extend farther back than the position of the dentes sapientiæ. Some persons are peculiarly sensitive about having anything touch the roof of the mouth. The roofless plate will not cause the sensation which in such cases produces nausea. Will W. H. W. try this plan and report?—J. M. A.

Reply to W. H. W., who asks for a remedy to prevent nausea from wearing an artificial denture. My remedy is apple brandy. I direct the patient to simply wet the plate with it, every ten or fifteen minutes at first, and in three days the nausea will be gone. I have used it in several cases, and it has acted like a charm.—J. W. C.

No More Dark Joints.—Pour for base as usual; in the second pouring have the plaster thin; then by tapping the flask on the table it will settle in all the outside joints of the case. Use wax for base, and after removing it cut gates in the plaster. Weigh the wax and balance weights and wax with Bow Spring rubber, allowing no excess. Then fill in the back joints with Agate cement, and allow it to become perfectly hard before packing. After packing, place the flask in water and raise to the boiling point; then remove it, or the rubber will become too soft and spoil your joints.—A. E. Street, D.D.S., *Camden, N. J.*

In July, 1878, a young lady came to my office to have the right superior second bicuspid extracted. It had been fractured by masticating some hard substance. It was split down the entire length of the crown and into the root, about three lines below the margin of the gum, detaching the palatine cusp and the portion of the crown belonging thereto from the buccal.

The pulp had been removed and the canal nicely filled three years before by a dentist in Baltimore. The operation had been well done, the gold with which it was filled adhering so firmly to the walls that the broken portion was prevented from falling off. I concluded to make an effort to save it. By means of a piece of small rubber tubing, stretched over the crown and pushed up around the neck of the tooth, I was enabled to draw the parts together so accurately that the line of division could not be discovered by the naked eye. I then removed the gold filling in the crown, refilled with os-artificiel, and dismissed the patient for two days. I prepared a bolt or rivet of twenty-carat gold, a little longer than the width of the tooth, on one end of which I shaped a round head. On the other end I cut a thread and made a nut to fit it. Patient came at the appointed time. I drilled a hole, a fraction larger than the bolt, through the buccal to the palatine wall, about one line above the free margin of the gum; made a countersink in the hole on both surfaces for the reception of the head and nut. I now dipped the bolt in Agate cement, pushed it through, and screwed up the nut firmly before the setting process of the cement began. The bolt was cut off and riveted on the nut, then dressed off and burnished. (The riveting was done with a plate punch.) I then removed the temporary filling, and refilled with Agate cement up the canal to the terminus of the fracture. In December last this filling was removed and a gold one inserted. The gold used was Kearsing's plastic-surface gold blocks, on account of its not requiring the same amount of pressure to make a solid filling that other preparations of gold require. At the present writing it is a success, and apparently as solid as the adjoining tooth. Will it stand?—J. F. G., *Salisbury, N. C.*

Dentos.—It is not merely desirable, but it is important that the technical terms employed in any science or art should be strictly accurate. Medicine has a great deal to deplore with regard to its phraseology, which is in a very great degree loose, inaccurate, and open to many other objections. The specialty of dentistry is not exempt from this defect. The term "caries" is in itself a misnomer, and is employed to designate, as is well known, a disease of the bones, to which the affection of the teeth bears no resemblance. Unfortunately, when terms like this come into common use, it is difficult to eradicate them. This is the case with the term referred to, and it has been generally agreed to allow it to occupy the place it has usurped. Of late the word "dentos" has been occasionally employed as a substitute for "dentine." On the ground that no chance should be given for the introduction of improper terms, it is desirable to call attention to the fact that this name is as great a misnomer, when applied to the part of the tooth it is intended to designate, as "caries." It is, however, not new. Its introduction has already been attempted, but the term has been rejected and is not employed in dental works. The term "dentos" is more applicable to the cementum than any of the other hard dental tissues.

Those who do not possess a copy of "Owen's Odontography"—and the work is rare in this country—may find interesting the author's account of the reasons why he preferred the word "dentine." The name owes its origin to this distinguished writer:

"The tissue which forms the chief part of the body of the tooth has hitherto received no distinct and specific name in our language; a particular modification of it which characterizes the tusks of the elephant is called 'ivory.' Some anatomists have extended the application of this term to the analogous substance in all teeth; others have treated of it under the name of the 'bone of the teeth,' or 'tooth-bone;' by the German anatomists it is termed 'knochensubstanz,' 'zahnbein,' and 'zahnsubstanz,' and some of the latest and most close-thinking writers have preferred the literal translation of one or other of these terms to the use of the word 'ivory,' which unavoidably recalls the idea of the peculiar modification of the tooth-substance in the elephant's tusk, to which it is restricted in common language, and in the best zoological works.* I propose to call the substance which forms the main part of the teeth 'dentine.' "†—R. A.

A Curious Case.—A young man employed in the railroad office here, and whom I have known for the past ten years, came into my office a few days since and showed me a tooth (the left central), of which he related the following history: Some four or five years since he was splitting kindling-wood, when a piece of the wood flew up and struck the tooth, and to all appearance knocked it out. As soon as the gum was healed up he had a substitute inserted, first asking the opinion of two dentists as to whether the tooth "wasn't in there somewhere," to which both replied, "No." About a week ago, in blowing his nose, the missing tooth was thrown out. During all the time it was missing it has caused him no trouble.—C. J. Peterson, D.D.S., *Dubuque, Iowa.*

Protecting Oxychloride Fillings.—The white zinc cement used for finishing microscopic slides is an excellent varnish to protect oxychloride fillings. A thin, even coat, applied with a camel's-hair pencil and extended some distance beyond the filling, dries rapidly, is readily applied, causes no pain, is not unsightly, and is often intact after several days. The surface must be perfectly dry before it is applied, and the dam kept on until it is hard. It is a chloroform or naphtha solution of hard Canada Balsam, colored with zinc oxide, and may be obtained of dealers in microscopic findings.—W. H. T.

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* The accurate Illiger distinguishes the "substantia ossea" of a tooth from "ebur," and separately defines both these modifications of the tooth substance. (*Prodromus Systematis Mammalium*, 8vo), 1811, p. 20.)

† *Dentinum.* Besides the advantage of a substantive name for an unquestionably distinct tissue under all its modifications in the animal kingdom, the term "dentine" may be inflicted adjectively and the properties of the tissue described without the necessity of periphrasis; thus we may speak of the "dentinal" pulp, "dentinal" tubes or cells, as distinct from the corresponding properties of the other constituents of a tooth. The term "dental" will retain its ordinary sense as relating to the entire tooth or system of teeth.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

CARIES OF HUMAN TEETH.

BY FRANK ABBOTT, M.D.,

PROFESSOR OF OPERATIVE DENTISTRY AND DENTAL THERAPEUTICS IN THE NEW YORK COLLEGE OF DENTISTRY.

(Read before the New York Odontological Society, December 17th, 1878.)

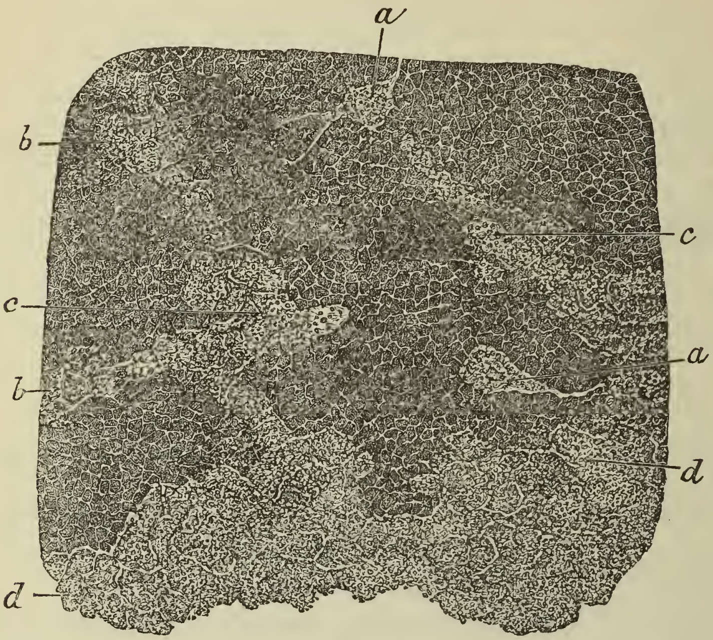
(Concluded from page 119.)

Caries of Cement.

So long as the gums are in their normal condition and position caries does not *begin* in the cement, but if the gums have receded from any cause, thus exposing the cement which covers the necks of the teeth, it may then begin to decay. I never have had an opportunity of examining primary caries of cement under the microscope, but of caries of this tissue advanced from within, viz., from decayed dentine, I have several specimens. The microscope reveals in these specimens a more or less advanced decay, which in its essential features is fully analogous to caries of the dentine when in a live condition; in other words, it is an inflammatory process. On the boundary of the caries we see, besides unchanged cement-corpuscles (see Fig. 6, *a a*), those which have been enlarged and transformed into medullary or inflammatory elements (see Fig. 6, *b b*). Nay, I have observed that the lacunæ holding the protoplasmic body were partly unchanged, while a part participated in the inflammatory process (see Fig. 6, *c c*).

The enlargement of the cement-corpuscles is evidently not due to a direct swelling of the protoplasm itself, but to a liquefaction of the surrounding basis-substance, in which the protoplasmic condition, and with this also the medullary elements which have participated in the formation of the basis-substance, reappear. The inflamed portions of the cement look granular with lower powers of the microscope, but high powers reveal the net-like structure of the living matter, and the formation of irregular polyhedral elements which are separated from each other by a light, narrow seam, this being traversed by extremely delicate uniting threads.

Fig. 6.



The history of development of bone demonstrates that this tissue originates from medullary elements, the so-called osteoblasts, which partly remain unchanged, and as such form the bone-corpuscles, while their greater part is transformed into basis-substance (Waldeyer). The history of the development of the cement has not as yet been studied, but we have good reasons for assuming that it develops in a way identical with that of bone, as both tissues are identical in their structure, and exhibit identical results when inflamed.

Dr. C. Heitzmann has drawn attention to the fact that the protoplasm of the medullary elements, when transformed into glue-giving basis-substance, does not altogether perish. It is only the fluid, non-living part of the protoplasms which, by chemical changes, is transformed into glue; the living part of the protoplasm, on the contrary, remains unchanged, and is simply concealed by the refracting power of the *glue-giving* basis-substance. That this view is a correct one the investigator named has proven by the appearances in inflamed bone, and I can fully corroborate his views from my observations on inflamed cement.

Virchow's view that the bone-corpuscles swell and divide into inflammatory elements by being converted into proliferating mother cells, is in my opinion wrong. No proliferation is demonstrable in the earliest stages of inflammation of the cement. Nothing but a decalcification, and thereafter a liquefaction, of the glue-giving basis-substance takes place in order to bring to view the very same medullary elements which once have shared in the formation of the cement. The inflammatory reaction in the cement-corpuscle itself may be so slight that (as mentioned above) a part of this protoplasm may look almost unchanged, while another part toward the decalcified basis-substance gives an appearance identical with that of the surrounding liquefied basis-substance. The result of this process is a transformation of the tissue of the cement into medullary or inflammatory elements (see Fig. 6, *d d*). These remain in connection with each other by delicate threads of living matter, but at last become disintegrated, and give, together with micrococci and leptothrix threads, a decayed mass, just as well as enamel and dentine.

Results.—After having examined teeth attacked by the carious process, microscopically, from the mouths of over thirty different persons, I can sum up the results of my researches in the following aphorisms:

I. In enamel, caries in its earliest stage is a chemical process. After the lime-salts are dissolved out, and the basis-substance liquefied, the protoplasm reappears, and breaks apart into small, irregularly-shaped so-called medullary or embryonal bodies.

II. Caries of dentine consists in a decalcification, and in turn a dissolution, of the glue-giving basis-substance, around the canaliculi as well as between them. The living matter contained in the canaliculi is transformed into nucleated protoplasmic bodies, which, together with protoplasmic bodies originating from the living matter in the basis-substance, form the so-called indifferent or inflammatory tissue.

III. Cement, if attacked by caries, exhibits first all phenomena known to be present in the early stages of inflammation of bone. The protoplasmic cement-corpuscles, as well as the basis-substance after its decalcification and liquefaction, produce indifferent or inflammatory elements.

IV. The indifferent elements originating through the carious process from enamel, dentine, and cement do not proceed in new formation of living matter, but become disintegrated and transformed into a mass crowded with micrococci and leptothrix.

V. Caries of a living tooth, therefore, is an inflammatory process, which, beginning as a chemical process, in turn reduces the tissues of the tooth into embryonic or medullary elements, evidently the same as during the development of the tooth have shared in its formation; and its development and intensity are in direct proportion to the amount of living matter which they contain, as compared with other tissues.

VI. The medullary elements, owing to want of nutrition and to continuous irritation, become necrosed, and the seat of a lively new growth of organisms common to all decomposing organic material.

VII. Micrococci and leptothrix by no means produce caries; they do not penetrate the cavities in the basis-substance of the tissues of the tooth, but appear only as secondary formations, owing to the decay of the medullary elements.

VIII. In dead and artificial teeth caries is a chemical process, assisted only by the decomposition of the glue-giving basis-substance of dentine and cement.

History.—John Hunter, "Diseases of the Teeth," etc., 1778, says: "The most common disease to which the teeth are exposed is such a decay as would appear to deserve the name of mortification. But there is something more, for the simple death of the part would produce but little effect, as we find that teeth are not subject to putrefaction after death, and therefore I am apt to suspect that during life there is some operation going on which produces a change in the diseased part."

Joseph Fox, "The History and Treatment of the Diseases of the Teeth and Gums," 1806, says: "The diseases to which the teeth are subject are similar to those which affect bones in general, and in like manner they have their origin in inflammation. The teeth differ only from bones in not possessing sufficient living power to effect the process of exfoliation."

Thomas Bell, "Anatomy, Physiology, and Diseases of Teeth," 1831, under the heading of "Gangrene of the Teeth, commonly called Caries," says: "The most common disease to which the teeth are liable is that which has hitherto been universally known under the name of *caries*,—a name which, although authorized both by English and Continental writers, is in this instance totally misapplied. It is, in fact, calculated essentially to mislead, as the disease has not the slightest analogy to true caries of bone. The perpetuation of so obvious an error as this is surely more than the most fastidious opponent of innovation could require. I propose, therefore, to substitute for it the term *gangrene* of the teeth, a word which expresses the real nature of the disease. It may be defined as mortification of any part of a tooth, producing gradual decomposition of its substance."

Farther on he says: "Still, however, the true proximate cause of dental gangrene is inflammation. And the following appears to me to be the manner in which it takes place. When, from cold or from any other cause, a tooth becomes inflamed, the part which suffers the most severely is unable, from its possessing comparatively but a small degree of vital power, to recover from the effects of inflammation, and mortification of that part is the consequence. That the bony structure of the teeth is liable to inflammation, appears not only from the identity of the symptoms which take place in them, when exposed to causes likely to produce it, with those which are observed in the other bones when inflamed, but more conclusively still from the fact, already mentioned, that teeth are occasionally found in which distinct patches, injected with the red particles of blood, have been produced by this cause after the continuance of severe pain."

Dr. E. Magitot, "Treatise on Dental Caries" (English translation by Dr. T. H. Chandler, 1878), in his general conclusions says:

"I. Dental Caries is a purely chemical alteration of the enamel and ivory of the teeth. Dental Caries is one. The varieties of form and color depend upon simple secondary variations in the nature of the altering cause, the progress, and the duration of the malady.

"Lesions of the enamel consist, after the removal of the cuticle, in a purely passive chemical disorganization of the prisms composing its tissue.

"Lesions of the ivory, consisting likewise in a chemical decomposition of its elements, may sometimes, though rarely, remain passive; but most frequently they determine in the tissue phenomena of reaction that manifest themselves by the appearance of a cone or white zone, formed by a mass of canalicules obliterated in consequence of a formation of secondary dentine.

"The tooth attacked by caries does not remain passive and inert, but may in some measure undertake to resist its action by the phenomena of condensing dentification of the ivory.

"The agent of dental caries is the saliva, become the medium of acid fermentation, or the vehicle of foreign substances susceptible of altering directly the tissues of the ivory and the enamel. Caries can be caused artificially by imitating the conditions of alteration that the mouth itself may present. It then offers the same characteristics as the morbid caries, with the exception of the phenomena of the organic resistance.

"The intimate mechanism of the production of caries is a simple solution of the mineral and calcareous salts which enter into the constitution of the enamel and of the ivory, by the agent of new formation."

Drs. Leber and Rottenstein, "Dental Caries and its Causes," 1873, say: "We have already several times remarked that the action of acids alone does not account for all the phenomena which appear in caries of the teeth. It is true that acids, even very much diluted, can attack the dental tissue; but we find in their mode of action differences which distinguish them from the phenomena and from the progress of dental caries. The acids attack first the enamel and rapidly change it to a chalky mass; later on their action is felt in a marked manner upon the dentine, which becomes more transparent, and, in fine, as if cartilaginous, by the very slow but progressive loss of its calcareous salts.

"Caries, on the contrary, proceeds slowly in the enamel; it is much swifter in the dentine, where it proceeds promptly along the canaliculi. This difference of progress must be attributed to the participation of the fungi in the work of the caries. The elements of the fungus glide easily into the interior of the canaliculi, which they *dilate*, and thus favor the passage of the acids into the deeper parts; these same elements cannot penetrate a compact enamel, or at least they enter more slowly, and only when the elements which form it have been greatly changed by the action of acids. . . . For them (the leptothrix) to be able to penetrate thus, it is necessary that the teeth be in a suitable condition; the enamel and the dentine must have lost their density by the action of acids. It seems that the fungi are not able to penetrate an enamel of normal consistence. The dentine itself, in its normal condition of density, offers great difficulties to their entrance, and we are not yet sure that the leptothrix could triumph over this resistance. . . . We cannot decide at present if the leptothrix is able to penetrate sound dentine when from any abnormal circumstance it happens to be denuded; but if the enamel or the dentine are become less resistant at any point through the action of acids, or if at the surface of the dentine a loss of substance has occurred, then the elements of the fungus can pass into the interior of the dental tissues and produce by their extension, especially in the dentine, effects of softening and destruction much more rapid than the action of acids alone is able to accomplish."

Carl Wedl, "Pathology of the Teeth," 1872, says: "It was quite natural to transfer to the teeth the signification implied in the expression 'Caries of bone;' indeed, the fundamental phenomena, namely, the destruction of the hard tissues, offered a striking analogy. In their development, however, the two processes by no means present such an identity. Caries of bone, as is well known, is an inflammatory process (osteitis) which originates in the soft parts of the bone and erodes its hard tissue. This is not the case with the carious process in the teeth, which commences in the hard tissues and spreads to the vascularized and nervous dental pulp. Upon close investigation the latter process is found to be so entirely distinct from the former that the attempt has repeatedly been made to expunge altogether from the nomenclature of diseases of the teeth the expression 'Caries of the teeth.'

"Notwithstanding the fact that our knowledge is advancing, unquestionably, with the continual addition to the auxiliary means at our command for carrying on the work, it must, however, be acknowledged that a theory with regard to caries with a thoroughly scientific basis in all its details is still wanting. . . .

"In sections made in a direction transverse to the axes of the radiating dentinal canals, a greater or less number of canals are met with whose limiting walls (the so-called dentinal sheaths) describe unusually large circles, and whose cavities are replete with a mass which has in some places a homogeneous, in others a molecular appearance, and forms convex projections beyond the surface of the section. The transverse diameters of the widened and filled canals vary, some being at least three times as large as others. The intertubular tissue presents a *molecular cloudiness*, and is beset with grains having the appearance of fat. In sections made parallel to the long axes of the canals they are quite clearly seen to be unequally filled by the foreign mass, since they present manifold varicosities and constrictions, which also explain the variations in the diameters of the widened canals. . . .

"Since we know that an interchange of material takes place in the dentine and cement during life, as is proved by the occurrence of atrophies, hypertrophies, and new formations, and that the dentine possesses a degree of sensibility, we cannot reject absolutely the idea of a reaction on the part of both hard tissues against the effects of external agents.

"Some authors seem to have had an intimation of this idea, since they were inclined to consider the textural changes in carious dentine as vital processes. There can be no doubt that the sensibility, sometimes increasing to actual pain, of the dentine, when deprived of its protecting covering, is a vital action, and that this becomes diminished when the most sensitive, the peripheral portion, is destroyed by an external agent. These facts, however, are by no means sufficient to enable us to draw a conclusion in favor of the reactionary power of dentine in parts which are attacked by caries. . . .

"In consequence of the decomposition of the secretions, acids are formed which extract the calcareous salts from the hard tissue, and give rise to a disintegration of the affected portions of the latter, in which no inflammatory reaction occurs."

Tomes, "System of Dental Surgery," 1873, says: "Although dental caries has been investigated and described by all who have written upon the subject of Dental Surgery, from the earliest period when disorders of the teeth first attracted attention down to the present time, yet it can scarcely be said that the nature of the disease is perfectly understood, for even now two hypotheses prevail. In one the disease is assumed to be no disease whatever, but merely the result of chemical solution of the dental tissues, and therefore dependent both in its origin and its progress on the uncontrolled action of physical and chemical laws. According to the other hypothesis, the fact that teeth are part of a living organism, if not essential to the origin of the mischief, at all events profoundly modifies its progress. Much has been written in favor of each of these views, and yet the subject cannot by any means be held to be settled."

In the appendix to this work we find the following "conclusions," viz.:

That caries is an effect of external causes in which so-called "vital" forces play *no* part. That it is due to the solvent action of acids which have been generated by fermentation going on in the mouth, the buccal mucus probably having no small share in the matter; and when once the disintegrating process is established at some congenitally defective point, the accumulations of food and secretions in the cavity will intensify the mischief by furnishing fresh supplies of acids.

CELSUS.

Roma. Ob. circ. A.D. 38.

BY E. W. FOSTER, M.D., BOSTON.

I.

PRÆFATIO.

INASMUCH as Celsus, one of the most distinguished physicians and writers in the brilliant Augustan age of Rome, was also one of the most considerable fathers of dental literature among the ancients, he holds a peculiar claim to our recognition in the filial estimate of what the founders have done for our profession. Some time since, on coming into possession of an old Latin copy of his "De Rê Medica," I was agreeably surprised at the extent and character of his observations on the teeth. As these paragraphs nowhere appear in any account of ancient dentistry, or in histories purporting to be such,—and esteeming the privilege of justice, even at this late day,—I have therefore thought it desirable to translate all such words of his as refer to the teeth and their associate parts.

It is interesting, through him, to learn how much we are indebted to pagan times, and how far the art of dentistry has advanced during the last eighteen hundred years.

In addition to what relates directly to the teeth, I have rendered also a few collateral paragraphs of his anatomy, surgery, and practice. These, however, will be chiefly interesting as facts concerning ancient medicine, especially as taught and practiced by our distinguished author. They will show, also to an equal extent, how far these branches had become developed, even in the far-off time of the Cæsars. With these are added certain *Celsiana*, or sayings of his.

Besides such account of Celsus as could be obtained by diligent search, and the testimony of some of his contemporaries, a synopsis of his admirable preface is given, which relates to the history and rise of ancient medicine, with that of his own time. The whole is divided into three parts, as follows:

I. Of Celsus and Ancient Medicine.
II. Celsus—concerning the teeth (translations).
III. Celsiana, or selections from Celsus (translations).

These are fraternally submitted to the young practitioner who would know of that which has gone before in the history of his own profession, and to the gray-haired veteran as well, who finds in life's decline increasing solace and pleasure in the memory and contemplation of the past.

Of Celsus and Ancient Medicine.

Aulus Cornelius Celsus was born in, or just preceding, the reign of Augustus Cæsar, the last emperor in the golden age of Rome; the culmination of which age under him, caused it to be generally called the Augustan, in his honor. This period is reckoned from Livius Andronicus [Ab Urbe Condita], 514, to the death of Augustus Cæsar, 767, Anno Domini 14. In the latter part of this period, including the generation just preceding Cicero, his own, and the one immediately succeeding, are to be found the most distinguished writers of old Rome,—they that in her classic and academic shades have added the greatest dignity and renown to the glory of the Imperial city.

Freund divides the bulk of Latin writings into three periods,—Ante-classical, Classical, and Post-classical. The classical he estimates from Cicero and Cæsar, to Tacitus, Suetonius, and the younger Pliny inclusive. By this division Celsus and a few other writers that follow him are to be included.

In the lexicon of Facciolatus, we find that Celsus heads the list in the next or silver age of Roman literature, but as he was born, grew up, and flourished in the preceding or golden age, and as his writings,—by their ease, elegance, and learning,—undeniably point to the best examples in this, he must be here included, albeit he may have lapped over by reason of longer years, among the first of the age following, like our own well-known author, Richard Dana, recently deceased beyond his ninetieth year, the Nestor of American literati. Fabricius, and in modern times Le Clerc, in his "Histoire de la Médecine," show with great probability that Celsus wrote towards the latter end of the reign of Augustus or at the farthest in the beginning of Tiberius.

This also would indicate that he was at his height in labor about the commencement of the Christian era, Augustus dying in the year 14 A.D. Though it appears from contemporary writings that he was living after the death of Augustus, yet it could not have been long, for Columella, who was then a young contemporary, refers to Celsus in his book on Husbandry, but not as then living. So from these and kindred accounts that bear to the same point, I am unable to place the death of Celsus beyond 38 or 40 A.D.

Of the life of Celsus himself we know nothing, save what is to be had from a few contemporary sources and what is to be gained psychologically from his works. The former is direct and undeniable as far as it goes, but the second must be necessarily less certain. In the first place, Celsus was a man profoundly learned, as appears from his works as well as from the testimony of contemporaries. He not only wrote his justly famous work on Medicine, now before us, and books on Agriculture, Rhetoric, and Military Art, but was well versed in Greek Medicine, Philosophy, and Literature. Columella, above referred to, speaks of him with great deference, and compares his book on Agriculture to that of the most learned writers of the time, and he says of him (lib. ii. c. 2), that "he was not only skilled in agriculture, but took in the whole compass of natural knowledge." His works on Agriculture, Rhetoric, and Military Art, were unfortunately lost to the world during the dark ages that followed the downfall of Rome. But we have no less an authority than Quintilian in praise of his work on Rhetoric, which he often quotes, and confesses that it was written with ability and correctness, though differing from him on some points. Quintilian again bears the most honorable testimony to Celsus in his Book XII., chapter II. He there mentions him among the greatest geniuses of Greece and Rome; for, after speaking to his pupils of Homer, Plato, Aristotle, Cato the censor, Varro, and Cicero, he goes on to remark that "why should he name any more instances [*i.e.*, of masters of science], when even Cornelius Celsus, a man of a moderate [!] share of genius, has not only composed books on all these arts, but has also left treatises on the Military Art, Agriculture, and Medicine, which, even to attempt these, requires us to believe he understood all these subjects; but to give perfection to so great a work is a different matter, to which no man has ever been found equal." There was evidently a little jealousy on Fab. Quintilian's part, but we imagine Celsus would have been content to be reckoned as having even a "moderate share of genius" among such names as Homer, Plato, Aristotle, *et sequentes*.

That Celsus was most thoroughly well versed in all the arguments and practices of the ancient physicians, and those of his own times, will appear from his works, and he was, we think, the master of them, both in learning and practice, in which latter, it would appear from his own admission, he followed the prognostics of Hippocrates, which, he says, all considered to be the most perfect, albeit other portions of this great author's precepts were not to be so well judged. He also agreed in many things with the great physician, Asclepiades, but was bold to state when he thought him in error. It is indeed refreshing to find that here was an ancient physician that had independence of thought enough to prevent its being sold out entirely to the quackery and superstition of his age. His sturdy Roman brain would not tolerate hypocrisy or lying, and when he strikes his lance, as he frequently does, into the heart of prevailing superstition, it often falls with the weight of a Roman broadsword.

He argues against Hippocrates in his belief of critical odd days in fever, and agrees with Asclepiades that these are not altogether reliable, for remedies may intervene to change them.

Then again he differs from both with regard to bleeding in certain distempers, showing that it is wrong, if not fatal in many cases. His own practice appears to have been singularly independent of routine, and to have depended entirely upon the merits of the case.

His modesty and candor in discussion with others is noteworthy; but when it becomes necessary to show up the fallacy of their arguments, one feels the grip of a mind of no common order, and it is easy to see that he was a foe to all sorts of quackery, and a dread to all pretenders.

Such has been the regard and confidence in him as a guide to medical practice, that his great work on medicine has suffered but little hurt from all the copying, poor proof-reading, and ignorance in the ages that followed him, and from the myriad editions that the press sent forth since the discovery of the art of printing, fourteen centuries after his time.

His work, even now in certain parts of the world, is still a chief guide to medical practice, and I hold it to have been fortunate that a man of such learning was permitted to influence to so great an extent the practice of medicine through the dark centuries of ignorance and bigotry that followed the downfall of the Roman empire. In the light of medicine as it is to-day, Celsus in many things bears a favorable comparison, and in general, his rules for health and diet are unimpeachable. From certain prophetic words in his works, it would seem that even then he caught the faint dawning of higher and grander triumphs for that profession to which he had devoted a long and industrious life, and enriched with so much that has been a comfort to suffering man during the long ages since he himself was on the earth.

SYNOPSIS OF PREFACE TO BOOK I.

With reference to the history and rise of medicine, Celsus here remarks that there is no place in the world where this art may not be found, even among the most barbarous nations, who are acquainted with many herbs for the cure of diseases; but the Greeks had improved the art more than any other people, though not from the infancy of that nation, but only a few ages before his own time, as appears from the fact of their celebrating Æsculapius as their oldest author, and because he excelled those, even in rude times, he was received into the number of their gods. His two sons after him, Podalirius and Machaon, following Agamemnon to the Trojan war, were very useful to their fellow-soldiers. But these, according to Homer, did not treat the plague or the various other diseases, but cured by incisions and medicines; from which it appears that they only practiced the surgical part of medicine, and this, Celsus affirms, was the most ancient branch. Homer testifies that diseases were then ascribed to the anger of the gods, and relief was sought by propitiating them. Though but few remedies were then known, it was because more were not needed, on account of the general sobriety of their lives. Yet sloth and luxury—those two vices which first appeared in Greece, and then in Rome—rendered the people more prone to diseases, many of which were hitherto unknown.

For the former reason no man of eminence practiced medicine until learning began to be pursued with zeal. At first the science of healing was called a branch of philosophy, so that the cure of diseases and the study of nature arose from the same persons; for, says Celsus, curiously, they themselves having injured their own bodies by anxious thought and nightly watchings, stood the most in need of its assistance; therefore, many philosophers came to be skilled in the cure of diseases. Among the most celebrated were Pythagoras, Empedocles, and Democritus; but Hippocrates, of Cos, said to have been a disciple of Democritus, was the first to separate medicine from philosophy. After him, Diocles the Carystian, then Praxagoras and Chrysippus; after these, Herophilus and Erasistratus. Medicine came now to be divided into three parts,—one covered by diet, one by medicine, and the last by surgery.

The first was joined to natural philosophy in the treatment of disease by diet, fearing that without its aid this method could not be maintained. First of all, however, Serapion taught that theory must have nothing to do with medicine, that the art must be governed wholly by practice and experiment. Apolonius and Glaucias, and after them, Heraclides, of Tarentum, and others of less note, held the same views; and from this dominant idea of their practice, styled themselves Empirics. So this first, or dietetic branch of medicine, became divided, the one side claiming theory, the other that of experience only, for their guide. Nothing new was attempted for a long time, until Asclepiades appeared, who greatly changed the art of medicine; and Themison, also a successor, even in his old age, made some advance even upon his master. And these are the men, says Celsus, to whom medicine owes its progress thus far. Celsus believed the second branch, or the cure of diseases by medicines, to be the noblest of the three, as well as the most difficult. But in this branch, as well as in the former, there came to be sides taken, and the air was filled with the volumes of the opposing forces. In this, also, one side claimed experience to be alone sufficient, the other, that this was not enough, but that a perfect knowledge of the parts, and what naturally happens to them, should be added. Celsus very candidly and clearly relates the arguments of both sides, the better, he judiciously says, that he may deliver his own opinion. They, on the one hand that hold to theory, he says, would know occult causes, or the principles that govern our bodies. Among these, Herophilus held the opinion that disease was owing to the different humors of the body; Hippocrates, the inspired air; some, that blood was transfused in arteries that were designed only for air, from which they were named, and which occasioned an inflammation, by the Greeks called *phlegmon.* And that inflammation was the cause of the commotion which is observed in fevers, was the opinion of Erasistratus; or that corpuscles passing through the invisible pores, stopped and obstructed the passages, and hence fever, was the opinion of Asclepiades. They termed those causes of disease evident in which the beginning was occasioned by heat or cold, by fasting, or over-eating, and the like. Those actions of the body which they termed natural were inspiration and expiration, the reception and digestion of the food, and its distribution to the different parts of the body. These also sought to know how it happens that the arteries rise and fall, and the cause of sleep and wakefulness, for they contended one could not treat these without a knowledge of them. Among all the phenomena, however, they thought good digestion the most important, and insisted chiefly upon it, but held many different opinions as to how it was effected. Some followed Erasistratus in the belief that it was due to attrition; others after Plistonicus, a disciple of Praxagoras, who held putrefaction to be the cause; others after Hippocrates, that it was caused by heat; and finally after all these came Asclepiades, who argued that they were all wrong, for the food, crude as first received, was in like manner distributed to the different parts of the body. So in these things they held no common agreement. They held in common, however, that the internal parts of the body must be studied the better to treat them in disease, and that dead bodies must be dissected for that purpose. Some, however, held that Herophilus and Erasistratus had the best method, who obtained criminals out of prison, by royal permission, and dissected them alive, the better to ascertain, while breathing, the action of those parts which nature before had concealed from view. They held that it was not cruel, as most people thought, to sacrifice by torture a few guilty ones in search of those things which rewarded men by remedies for the whole innocent race of man for all ages. Those, on the other hand, who held to experience alone, admitted evident causes as necessary, but held that the search after occult causes was fruitless, for nature was incomprehensible, and that they were able to perform cures without this knowledge was not to be denied. And again, that by this rule, philosophers ought to be accounted the greatest physicians who had so much of theory; whereas, they were generally anything but skillful. They held also that practice changed in different climates and in different countries, else would the same remedies be good for all. In the midst of doubt and uncertainty, however, they preferred the tried and sure. From all these arguments, pro and con, Celsus concludes that theory is not essential, and had little to do with actual cures beyond what common sense and experience afforded. He says, these cures and remedies came about first from the common people, who had learned from many things what was good and what was hurtful, and so abstained from the one while they cherished the other; and physicians but followed in the wake of these real facts, and prescribed accordingly. From these facts, Celsus declares that medicine was not invented in consequence of all this reasoning, but that theory was sought for after the discovery of medicine. Further, those that held for experience in medicine, maintained that the cause of a distemper was of no consequence, but what removed it; not what was the cause of digestion, but what would cure its distempers; not how we breathe, but what would cure difficult and slow breathing; not the cause of motion in the arteries, but what each motion there indicated; and these are to be known only by experience; and finally, that a great deal may be said on both sides. Those that held for experience as their guide, were stoutly opposed to vivisection as being cruel, and that the causes of life could not be found out, because death would intervene in such cases before the knife had reached the most internal parts, and thus torture be added to folly. They held, however, that all such facts as were necessary to know, could be obtained from the many that were accidentally wounded; and they objected even to the dissection of dead bodies, on the ground that the parts were not as in life.

Amidst all this, Celsus advised a sensible course, that did not, he said, slavishly follow either extreme, but was intermediate, as it were, between the two; that there was much to be gained by experience, and much also from a knowledge of the interior parts of the body. Yet he appears to claim for experience the better method of the two, and fortifies his ground by the remark that neither a husbandman nor a pilot is qualified for their business by theory, but by practice.

But he strongly urges the use of one's judgment and invention in any case, and these are especially to be called upon in all sudden emergencies.

He considers it highly necessary to inquire of the patient his habits and mode of life, and of all those minutiæ which will aid in the discovery of the proper treatment and remedy. Celsus flatly and successfully contradicts the opinion of Erasistratus in his assumption that these details are of no account whatever in the practice of medicine, nor have anything to do with cure; and with remarkable pungency and conciseness replies that it does not by any means follow that what does not hurt one person will not hurt another, or what affects a person at one time may not at another, for there may be some latent circumstances in respect of weakness, or other disorder, that either was not in another, or in the same person at different times, and though these be not considerable, yet may affect the body more or less, and render it the more liable to disorder. And, if one were versed in the knowledge of common nature, he would know this, that nothing happens from a single cause, but that it is to be adjudged the cause which seems to contribute most to the effect.

Though Erasistratus holds that fever arises from the transfusion of blood into the arteries, yet, says Celsus, he cannot tell us why two persons, equally congestive, are not alike affected with fever. But Celsus cuts the knot for him, and makes the observation that the difference in the two is due to some one or more of the very things he has just pointed out, as over-eating, heat, cold, fasting, and the like, which Erasistratus accounts of no use in the reckoning. Celsus hereon continues at some length to untangle the cunning sophistries of the physicians, which he does in the most masterly manner, and it is easily seen that the cast of his mind was a superior one, and that he held in those times of medical superstition and arrogance, extremely modest, liberal, and sensible views of medicine and general treatment of health and disease. And his remarks for the sick and healthy, in the matter of diet, climate, occupation, age, and the like, would hold good in our times; in fact, his very phraseology, in very many instances, has been handed down to us unimpaired, through the great depth of eighteen hundred years.

Sir Astley Cooper remarks that the method of lithotomy, as described by Celsus, has been the method chiefly preferred for over sixteen hundred years, or to within one hundred and fifty years of our own time; in fact, in essential particulars, it differs not from that of to-day.

Celsus concludes his first preface with the following sensible remarks, a credit both to his head and his heart: "To return to the point, my opinion is that medicine ought to be rational, but to draw its methods from evident causes, those that are obscure being removed —not from the artist, but from the art. Then again, to dissect living bodies is both cruel and superfluous, but to dissect the dead is necessary for learners, since they ought to know the order and position of the parts, which a cadaver will better show than a living and wounded man. But of other things, which are only to be discovered in living bodies, practice itself will demonstrate these in the treatment and care of the wounded; a little more slowly, perhaps, but with more compassion. Having delivered my views on these points, I shall lay down the proper rules to govern people in health, then proceed to those which are related to diseases and their cure."

(To be continued.)

GUM AND ALVEOLAR DISEASES.

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At the Massachusetts Dental Society, held in Boston on the 12th of December last, I read a hastily prepared paper upon "Riggs's disease," and being requested to publish it, I offer the following to the Dental Cosmos as embodying the ideas therein.

There are three forms in which gum lesions, such as I confine this paper to, present themselves. The first is a simple recession of the gums, exposing more or less of the necks of the teeth, without any other sign of disease than loss of substance. We see this shortening of the gum in persons who are very particular in the use of the brush; the mouth is especially well kept; the teeth have a polished enamel; are usually not largely decayed, prominently set in the arch, and the gums are pink in hue and of firm consistence. The gums have simply withdrawn from the natural point of attachment,—the terminal thin edge of the enamel,—retired gracefully and calmly, without excitement or "flurry," taking with them the delicate alveolar borders; and leaving exposed the polished cemental covering of the neck of the tooth.

What is the cause of this condition? Chiefly feeble vascular action. It arises in the mouths of persons who have indigestion, and whose circulation is less active in the surface vessels or capillaries of the skin. The gums themselves are of a *pale* pink, and do not bleed more than a drop or two, if wounded by a sharp instrument. This want of tonicity is a constitutional and predisposing tendency.

The direct and inducing causes are various. Among them may be mentioned the daily use of tooth powders with too great mechanical properties, or any powder not entirely soluble in the fluids of the mouth. Daily use of powder by the brush leaves a constant deposit beneath the free margin of the gum festoon; and the irritation thus induced, though insufficient to cause any noticeable degree of congestion, will after a time cause a solution of the gum ligament which always exists in the young mouth. It is probable that hot foods and drinks contribute their quota to this result by their atonic influence.

The sympathy of the mucous lining of the alimentary canal is continuous through its whole length, so that indigestion and dyspepsia, though never so slight, cannot but impair the functional activity of that membrane directly, as well as indirectly, through the loss of nervous energy.

Those persons usually said to be of a bilious temperament are most subject, other things being equal, to all degrees of gum lesions. The nervo-sanguine temperament resists by its more perfect circulation local irritations of the gums. In such, recession does not take place in the same manner. Local irritations cause congestions and elongation of the V points of the gums, attended by increased redness and other signs of diseased action. And even when inflammation exists, if early remedies are used, the gum comes back to its normal condition without loss. But in the cases under consideration there is no sign of diseased action in the gums themselves, except their shortening. This process is exceedingly slow, continuing for many years before the tooth is thereby loosened; but late in life, when all the forces of vitality are impaired, a more active disease sets in, attended by pain and soreness, and the teeth are finally lost.

The marked feature of this lesion is the close adherence of the gum to the alveolar border, until the later inflammatory symptoms set in. An instrument is resisted in an attempt to pass it beneath the margin of the gum, and when it *is forced* under the edge the alveolus is immediately met with. In this variety the recession is most rapid upon the labial and buccal faces of the roots, often leaving elongated processes of gum between the teeth where they are firmly adherent over the septal partitions, retaining the characteristic firmness and pale roseate hue.

I know of no remedies that are effectual in staying this adynamic form of ulitic trouble. One of my homœopathic friends believed he could arrest it; but, after trying for six months various remedies, failed in the case of a young lady, whose physical condition was otherwise much above the average. If I am right in the pathogeny of the disease, the remedies must be of a general or systemic character, after removing all discoverable local irritants.

The second form of gum lesions under consideration is that which is most familiar to dentists, viz., those induced solely by lime depositions. Here we have loss of gum by the irritation of the presence and pressure of the accumulated lime; sometimes attended by inflammatory and suppurative conditions, but more generally only the swelling and tenderness of congestion. The gum retires slowly, though more rapidly than in the first form; and the alveolar border, deprived of nutrition at the point of pressure, is consentaneously absorbed. This process continuing for a series of years, the teeth are lost by loosening. This loosening, however, unlike both the first and third form, is produced by a constantly present and visible local cause, and is chiefly mechanical; the well-known principle of absorption from pressure is here obviously sufficient to explain the loss of parts, for as the gum is withdrawn new particles close the space that otherwise would exist, and thus the contact is maintained.

The deep banks of accumulated calculus that are frequently seen upon the lingual surfaces of the roots of the lower central incisors, reaching nearly their whole lengths, and filling all the interspaces like a plastered wall, are good examples. Even teeth thus affected, where inflammation is not present, retain considerable firmness by the attachment of the labial and lateral surfaces, showing that there is no periosteal disease. Teeth are even lifted, as it were, free from their places by the deposit investing them completely, so that only an eighth of an inch of the point of the root is seen after extraction (I have several such); and yet there may be no periosteal inflammation until the very last stages of the loosening.

This form of lesion differs from the first, then, chiefly in being caused by mechanical pressure, while that was by constitutional tendency or functional impairment. That was marked in its progress by a firm consistence of gum and normal color, shading paler, and giving evidence of care and cleanliness; while this shows neglect, thickened and congested gums of a heightened color and spongy texture. In both the periosteal coverings of the alveoli and roots are in a normal condition, except at the progressing point of absorption, where the nutrition is cut off. And this is the line of distinction between them and the third form, or what I understand to be "Riggs's disease."

The treatment of the second form of gum lesion is simple and obvious. Remove the cause, cleanse from every particle of deposit, and the work is done, essentially. A gum wash as a tonic and sedative is pleasant and useful, but not necessary to restore health to the gums, provided the dentist has been sufficiently thorough, which he cannot be in cases of large accumulations in less than three sittings, with a ten days' interval between them. This part of a dentist's duty, viz., cleansing the teeth from all deposit, is neglected very sadly by a large portion of those who practice dentistry. I have seen magnificent monuments of skill in gold foil in mouths that were utterly neglected so far as the health of the vascular tissues was concerned, though the patient was fresh from the dentist's hand. The extent of cleansing teeth is too often to remove what is in sight above the gum, while that beneath the margins is neglected. The destroyer is thus left to continue his work, while only his sign is removed.

The third form of gum lesion is what I understand is meant by "Riggs's disease." It is about three years since I first heard it so called, although I had treated cases of it years before. I remember consulting Dr. Atkinson, about 1867 or '68, in relation to an obstinate case that I had under treatment, and his advice as to treatment was about what Dr. Riggs gives in his paper, with the addition of iodine and carbolic acid combined. I see no objection, however, to calling the disease after Dr. Riggs, not that I think he was the only man who treated the disease successfully up to the time of his paper on the subject, but rather because he has made it a distinctive lesion, and pointed out the real seat of the trouble as being the necrosed alveolus. There is no single word that describes the disease, and by "Riggs's disease" we shall all understand that a certain distinctive form is meant just as is understood by "Bright's disease," and others called after those who first publicly described their characteristics. It seems to me, however, that the reader of Dr. Riggs's paper is rather led to believe that the only difference between what he describes and those forms that I have pointed out in the foregoing, is one of *degree.* His first stage, for instance, "Bleeding of gums upon slightest touch," attended with "inflammatory margins," often exists without the peculiar feature which is especially characteristic of this lesion, viz., the death of the peridental membrane. In mouths badly kept the gums are frequently thickened at the festoon margins, packed with tartar, inflamed, and exuding pus; but the edge of the alveolus will be found sound and entire a line or two behind the edge of the gum, and it is not absorbed faster than the gum itself. Such cases I class in the second form of lesion, and there is no real disease, but simply mechanical pressure and irritation. Here, however, we get a disease that is initiated and continued without any visible mechanical irritation in many cases; and I believe the death of the peridental membrane, depriving the alveolus of nutrition, accounts for the death and disintegration of the bone; or, as is believed by some, among them Dr. Waters, of Boston, the alveolus is destroyed by vegetable parasites.

This disease may be recognized as distinct from what has been described by this peculiarity, viz., *loss of alveolus without loss of gum.* We have seen the gum and alveolus retire together, the former being adherent to the latter so long as the tooth was not loosened, so as to cause irritation and inflammation by its motions. Here, however, we often find a gum perfectly healthy in color, and without congestion or thickening, not retired in the least from its natural point of attachment at the neck of the tooth, with its alveolus lost to quite an extent.

I have lately met with three instances of this kind, in two of which there was no particle of lime deposit that I could detect after most careful search; and I was the more particular in my examination, from the doubt expressed of the correctness of my observation in the discussion of my paper in December, at the meeting of the Massachusetts society. I will give one case—that of a lady, Mrs. W., between forty and fifty years of age, of a nervo-bilious temperament, for whom I had treated the two central incisors of the upper jaw, about two years since, for this disease. December 11, 1878, she called, and remembering this fact, I examined them to see if the cure had been permanent. I found the right central in perfect health, but on passing a thin instrument beneath the margin of the left upon the lingual surface, it passed more than an eighth of an inch before reaching the edge of the alveolus, and without exciting any pain. There was no secretion, no tartar, no discoloration, no thickening of festoon margin, but to the eye perfect health; and yet the edge of the socket, instead of being just behind the margin of the gum, was gone as indicated. On further examination, I found the bony edge on the lingual and posterior approximal surface of the cuspid root to have wasted one-fourth to one-third of an inch; but I found not the slightest trace of tartar. The gum lay closely in contact with the root at its natural point of attachment, and evidently excluded the saliva from the pocket; and, in my opinion, it was for this reason that I found no lime deposits.

The two other cases that I have met with since were much the same in description. In one my attention was called to it by a complaint of pain or of an uneasy feeling in the two lower central incisors. On these the socket was gone to nearly the apex of the roots, extending in width about one-fourth of their circumference. In this case there was a slight deposit of tartar, but the gum had a healthy color, was of its full length, and appeared to the eye in contact with the neck of the tooth. The other case was only noticed in consequence of my being awakened to the fact that the disease can exist without uneasy sensation to the patient, and where there is no symptom of disease to attract the eye of the dentist. At this early stage of the lesion we have no extra vascularity of the gum and no secretion, either of altered lymph or pus; indeed, nothing but the loss of the alveolar wall to a limited extent, to indicate any departure from normality. And I am at a loss to account for the absorption of the socket upon any other hypothesis than that of atrophy of the peridental membrane, or of the external fibrous covering of the alveolus, unless the other suggestion of vegetable parasites better explains it. In relation to the latter, however, according to Leber and Rottenstein, cleanliness of the teeth is not favorable to the existence of "Leptothrix," or any of the vegetable fungi that are supposed to be among the causes of dental caries. This fact is a bar to the adoption of the idea of their influence, since I have never seen a case of this lesion in a mouth that was not well cleansed. Indeed, in all cases where I have met with it, the teeth have been of a fine quality and but little subject to decay. Those teeth of poor quality that "gold won't save" never get loose from this cause, so far as I have observed.

A well developed or somewhat progressed stage of "Riggs's disease" will attract attention by a change in the color of the gum; it is dark red or purple in hue, swollen in its general aspect, and thickened at the edges; the festoons are loosened from the necks of the teeth; they may or may not be shortened, according to the stage of the disease. A secretion will be seen to exude from beneath them, on pressure, of sanies or pus sometimes mingled with blood. Gums in this condition are at times extremely sensitive and painful; at others but little so, having an indolent soreness only. Beneath such gums a probe will pass in varying extent without meeting resistance from the alveolar wall; that is, at certain marginal points, as on the approximal sides, or on one side only, the edge of the socket has receded one-third, one-half, or even the entire length of the roots. The point of attack is not uniform, however; it may be the buccal, or lingual, or approximal surface; but wherever it is, it extends in the direction of the long axis of the root chiefly, and not laterally; *i.e.*, the waste of the socket does not progress around the circumference of the root, but seems to do so in strips, beginning at the gum margin and extending longitudinally, so that the sulcus near the extremity of the root may be found, though narrow, widening in the direction of the crown but little. In this way a tooth is found to have a perfect socket on one side the entire length of the root, while on the other, to an equal extent, it has none at all. At this point in the progress of the disease the tooth is loosened but little, while in a later stage, the socket embracing but the apical end of the root, it becomes extremely loose.

Having arrived at this point of the diagnosis, the next step is to pass a thin wedge-shaped instrument along the root until it meets the edge of the socket, one-half or two-thirds of its length, it may be, and then, keeping close to the root, the instrument can be insinuated for several lines in depth between it and the wall of the socket without any pain to the patient. Here, then, is found considerable space quite insensible, showing death of investing and reflected periostea. This space is so great in some instances that the loss of the membranes does not account for it, and it suggests the thinning of the alveolar wall by loss of its internal surface. If we examine with a spoon- or saucer-shaped hoe excavator the edge of the remaining alveolus, we shall find it easily cut and not sensitive; unless the gum is wounded the patient will give no sign of pain. The disintegrated bone cuts more like a tough-fibered wood than like healthy bone. Upon the roots of teeth affected to this extent there will usually be found nodules of lime deposit, but not always. I have extracted such teeth that were entirely free from tartar. Dr. Riggs seems to think the tartar accumulations cause the disease. If this were so we should expect to find the deposit near or quite up to the edge of the retreating bone; but after very careful manipulation I have never found it so. My observation in this respect agrees with Mr. C. S. Tomes, of London (see *Miscellany* for October, 1878). And also that its presence is due to the existence of the pocket into which the deposit is carried by the saliva in solution. In other words, the tartar is an accidental sequence and not the cause of the difficulty, although it will generally be found present, roughening the surface of the root.

Mr. Tomes speaks of the *acute* form of the disease. I have supposed that, properly speaking, it had no acute form. At its onset, its insidious approach is by such stealthy footsteps that there is no warning until soreness and inflammation are the effect, and not the forerunner of the attack. When it has progressed considerably, the foreign deposits irritate and weaken the vessels of the gum, and inflammation, very acute, *may be the result* of a cold or force on the diseased tooth.

Mr. Coles has found this disease "to occur most frequently among men subjected to great mental strain, as civil engineers, physicians, and barristers, and also among women after exhausting illness, and after frequently recurring pregnancies," etc., etc. It is a little singular; but all the ladies in whose mouths I have found it, without exception, considered themselves exceptionally well and strong; a majority were not married, and those that were, had small families, and were robust.

Yesterday (February 8) a maiden lady of thirty-five, recently grown stout, presented for examination. I found in the upper jaw nearly all the teeth affected by this disease. She did not suspect it; had not experienced any disagreeable sensations in the gums. One molar is past hope; the lingual surfaces of the incisors are affected; the gums there are thickened at the edges, but not receded, and there was no "pyorrhœa," yet the sockets are shortened half the length of the root. I took especial pains to look for tartar as a cause. I found none near the edge of the retreating socket, only a little under the margins of the gums, but on the *lower* teeth there were large amounts, yet this disease had not been set up at all upon them.

I will close this paper with the story of one more case, and it was this case, or rather the experience of the patient, that induced me to write upon the subject; and I would not now give this, only that I think it time somebody stirred up "our first operators" in the big cities.

A lady of twenty-five years, having plenty of money and willing to use it, was directed by her dentist to go to Boston to his brother for treatment. She did so and was treated for six months with no benefit. Then she applied to another gentleman who has acquired a high reputation as an operator. He treated her for congested gums by lancing, and dismissed her. Then another of equally great skill and reputation, as well as experience, took her in hand for six months. She experienced some temporary relief, but no arrest of her disease. She then applied to a professor in a dental school, who gave her one sitting, and told her to call again in six months, and assured her she need not feel anxious, as she would not lose her teeth for some time yet. Since she became aware of trouble by the "gnawing" and uneasy sensations in her gums, attended by a flow of pus, it had been two years, and during all that time it was the burden of anxiety in her thoughts. She had made diligent search for relief, but had given up in despair.

October 21, 1878, a lady of fine physical appearance, giving evidence of good general health, applied to me on account of a cavity in a front tooth. The first glance at the teeth thrilled me with delight. Here were thirty-two teeth in elegant array, large, finely formed, of a finely-polished enamel, and giving every sign of strength and durability; a very few had been filled, and the decay she referred me to being of slight importance, I directed her attention to her gums. She drew a sigh of despair, and said, "Yes, I know it; I have no hope now left!" Then followed the foregoing story, related with much detail.

The gums of the upper and lower bicuspids and molars on the right side were purple and swollen; on pressure pus flowed freely; they had receded from one-sixteenth to one-eighth of an inch from the natural point of attachment. All these teeth were loose; the bicuspids and molars of the upper jaw considerably so. The alveolar septa were almost entirely gone, the attachment remaining on the buccal and lingual faces of the roots of bicuspids, but absent on the palatal roots of molars. On the left side of the mouth the conditions were the same in kind, but less in extent. Roots rather roughened; scattered over them small patches or nodules of tartar. The diseased alveolus at the margin was separated from the roots to quite a depth, so that an instrument such as a flat drill could be pushed between roots and septal wall without inflicting pain. That was a good place for tartar, but there was none there, or anywhere about the alveolar border; I mean in contact with it.

It would not seem necessary to give the details of treatment, as Drs. Riggs and Atkinson have already given it; but the experience of this lady admonishes me that there is need of more light.

After explaining the nature of the disease, the length of time required for a cure, and telling her that the necessary operations would be painful, she answered, "I will undergo any torture to save my teeth."

October 21, removed accumulations on the roots of two bicuspids and two superior molars, and cut away the necrosed margins of alveoli to a point of vitality. To my surprise but little pain was produced, showing to what extent death of the tissues involved had progressed. There was a dull soreness, but no acute suffering. I used a properly bent instrument with a saucer-shaped extremity, or "spoon excavator;" after which I saturated floss silk with aromatic sulphuric acid, and packed it firmly into the upper extremity of the pocket, allowing it to remain for fifteen minutes. After removing the silk, syringed with warm water, and dismissed the patient.

October 25, gums less purple; repeated treatment, occupying about an hour; this, because roots were not thoroughly cleansed, nor dead bone all removed. Sensibility somewhat quickened and character of pain changed. The use of the acid was designed to aid the removal of dead tissue and lime deposits, and to stimulate to granulation.

October 31, appearance of gum much improved. On carrying probe to extremity of pocket the roughened bony feeling was changed to a softer, velvety touch. A layer of granulation had covered these, but there was still a little pus. Applied the acid half strength to encourage the vessels to healthy action. At this sitting operated on the antagonizing molars, the posterior root of the first molar being exposed to the very apex, the gum having receded one-fourth of an inch. Treatment same as above.

November 11, 25, and December 3, had sittings of an hour each, confining the treatment to these first seven teeth.

At each sitting the gums shortened as the congestion was removed, and left wide spaces at the necks, which were filled with a loose lock of linen lint rolled in vaseline, with directions to change daily. The object was to prevent any foods from entering the pockets. The patient was directed to use the other side of the mouth in eating, that the forming granulations might not be broken.

On December 11, I had the satisfaction of seeing the very wide and deep pockets of the teeth first operated upon entirely closed with new tissue, and the teeth themselves quite firmly set; indeed, nearly as fast as the teeth not affected. The gums were perfectly healthy in appearance and sensation to the patient. I purposely neglected treatment of the other side of the mouth till the new tissue should be hardened beyond the danger of injury in mastication.

In January I began treatment of the other teeth entirely by mechanical means, *i.e.*, without the use of the acid, being desirous of determining how much, if anything, is due to it in the process of cure, as Dr. Riggs has succeeded by surgical treatment alone.

February 18. Saw patient to-day. The cure is nearly complete upon the side first treated; while on the other the progress is as great without the acid as in the same time where the acid was used; but in the latter case the lesions were much greater than in the former. There is no doubt that the acid promotes tonicity and granulation, but it excites sensitiveness in the cementum where the root is not entirely covered.

March 13. Have been forced to use the acid, the progress of cure being stayed.

REPLY TO DR. W. C. BARRETT'S "REVIEW OF THE NEW DEPARTURE."

BY J. FOSTER FLAGG.

At the regular meeting of the New York Odontological Society, held October 15, 1878, Dr. W. C. Barrett, of Buffalo, New York, is reported as having read a paper having for its title, "New Principles in Dental Pathology, a Review of the so-called New Departure."

The eminent position occupied at one time by the gentleman, as President of the New York State Dental Society, demands that some notice should be taken on the part of the advocates of this movement of the curious mixture of inaccuracies, misstatements, and peculiarities of *reasoning*, (?) offered as the deliberate production of "four years'" experimentation, and *eleven months*' consideration!

The very first statement, trifling as it is, is incorrect, for there never was any paper written upon "Plastic Fillings and the Basal

Principles of the New Departure," and *therefore* no such paper could have been read.

In the authorized report of the Odontological Society, it expressly states that the "essayist of the evening *spoke* as follows:"

The remarks were *reported stenographically*, and the only reason that I had for requesting that they should be *so reported*, was that there should be no *doubt* as to *exactly* what I had *said;* because I intended to stand by my words, and because I desired especially that those engaged with me in that which was "modestly" called the "New Departure," because it *certainly was one!* should *know* that even in the excitement of an off-hand address, I had not in the least overstepped our agreed boundaries by any misrepresentation either of facts or ideas.

And, again, almost as a closing enunciation, the gentleman is equally inaccurate, for he says he "cannot do better than quote Dr. Palmer" (for the *author of the paper read* (?) before you a year ago announced himself as *simply the mouth-piece of Dr. Palmer*).

The stenographic report says, "I am, for the moment, literally but a mouth-piece; Dr. Chase has spoken to you;" so, from being a *momentary* mouth-piece of Dr. Chase, I am summarily changed into "simply a mouth-piece of Dr. Palmer!"

These are mere *inaccuracies*, it is true, but they are very fitting antecedent and *succedent* to the graver misstatements, misapprehensions, and misconstructions of this hydra-headed effort!

As a second proposition, Dr. Barrett says, "That essay has attracted attention in some quarters, but *much the greater portion* of the profession have *chosen to ignore it altogether*." (The italicising is mine.)

In reply to this I prefer merely to quote the words of the chairman of the Executive Committee, Dr. W. A. Bronson, who said at the same meeting, "The 'New Departure' has developed more experimental and general investigation than almost any other question presented to the profession in a long time. It has been the live question of the year. While I, in common with most of the profession, repudiate its doctrines, yet I feel that the society will always be glad to become the medium of presentation of any ideas or propositions which will develop an equal amount of professional research *and discussion*." (The italics are mine.)

The gentleman next objects to the "New Departure," and declines giving it his support (?) because he "believes it to be a mere vagary of the mind," and "a fallacy which does not even rise to the dignity of a sophism." Surely this is weighty *argument*, and would be equally strong proof of the questionable mental caliber of those members of our profession who had, by their experimental and general investigation and extended discussion, expended so much energy upon such a miserable apology for a fallacy! that did not even reach the dignity of a sophism! Well, perhaps not; but "we" think *time* will tell a different tale!

And next, the essayist informs his hearers that he has been four years closely examining this matter, and that the better he becomes acquainted with its basal principles the more firmly established becomes his faith in long-settled practice.

He kindly *adds his testimony* to that of both Dr. Chase and myself, in accrediting to Dr. S. B. Palmer ("we" always call it "*Palmer's* electro-*chemical* theory!"), and admits that Dr. Palmer is a *student* (these italics are his!) "according to his light" (!)

"We" agree to this, and moreover think that he has been endowed with an abundant supply of excellent light; so much indeed that he could have easily spared sufficient to have very decidedly added to the illumination of those "four years" of "close examination" into the basal principles of the "electro-*chemical* theory" which, in a most "will-o'-the-wisp" manner, led the gentleman who *thus* obtained "the right to sit in judgment upon this proposed new method of practice" to start off with the dreadful announcement that

"*The new doctrines call upon us to believe that electricity*, PER SE, *is the destroying force*" ! ! !

Four years to reach this! I sincerely trust that the *majority* of the members of our profession will find out upon "close examination" that the "new doctrines" *do not* call upon them to believe any such statement, for it really does not even rise to the dignity of a sophism.

But it truly becomes amusing when the essayist soberly informs us that, according to his "apprehension, the galvano-electric current in the mouth" (I don't know *how* he knows it's there! *we* never could *find* it!!) "is but the *effect* of tooth-decomposition through chemical changes in the mouth," and *thus* squarely arrays himself upon our side as a first-class, thoroughly educated "New Departurist," who would pass for a *student* with more than an average *supply of light!*

This is the "First" of eleven "reasons" for believing the New Departure a fallacy! *Ten* such would certainly have been sufficient, but "there's luck in *odd* numbers!"

Second (Reason), "any electric current which may be detected in the oral cavity is possibly due to other causes than the presence of the elements of a voltaic battery. There are constant thermal changes which are quite competent to deflect a delicate galvanometer. Before we alter our practice entirely we desire to know that any possible current is traced to its proper cause."

We would regret that any tracing of any current should be regarded as any reason for any alteration of practice, unless *facts* which evidently pointed to a *need* for such alteration had been sufficiently established. If it has not been established that soft teeth do decay badly around *gold* fillings; if it has not been established that soft teeth decay less around *tin* fillings; if it has not been established that soft teeth decay less still around *gutta-percha* fillings; if it has not been established that soft teeth decay least of all under *oxychloride of zinc* fillings, then we of the "New Departure" do not know of any dental facts which have been established.

First having our *facts*, we *next* endeavor to evolve a *theory*, which in accounting for these facts shall inversely suggest a remedy.

We note an unvarying accord between the "relativity" of filling materials upon the voltaic tension scale, and their protecting capability in the arrestation of dental caries, and we argue, therefore, that "in proportion" as filling material is *non-metallic* (other qualities being as desired), so is it incapable of aiding decay by any galvanic influence which would add its power to *existing chemical disintegration*, and which would thus increase decay of the tooth-bone.

And we argue further that any filling material—metallic—is incapable of retarding the progress of decay, other than by mere mechanical adaptation to the walls of the cavity, thus in a degree excluding moisture, just "in proportion" to its high degree of electrical conductivity and to its resistance to *attack* from the fluids of the mouth, thus producing *tarnish*, and thus interfering with its perfect conductivity; thus we say that *tin*, from its *low conductivity* and *liability to discoloration*, is the best known metallic stopping for a cavity of decay, provided such cavity is so circumstanced as to permit of an excellent mechanical adaptation of the material to its parietes.

We say that *amalgam*, from its *moderate degree of conductivity*, its liability to discoloration and its plastic ease of adaptation, is the best *metallic* filling for difficult, inaccessible, thin-walled cavities in soft teeth, and we say that "in proportion" as teeth *need* saving, *gold* is the WORST metallic filling material because of its *high conductivity*, its exemption from discoloration, and the exceeding difficulty of its accurate adaptation to the frail-walled and inaccessible cavities.

It is by such reasoning as this that we think it fair to presume that the currents which seem to be produced in connection with dental caries have been "traced to their proper cause" through the instrumentality of the "electro-chemical" theory, and it is for this reason that Dr. Chase and I have accepted Dr. S. B. Palmer's theory, and while gladly acknowledging the very proper testimonial to our *theorist* on the part of Dr. Barrett, go much farther and endeavor to the utmost to impress our fellow practitioners with the *truth* of the "Palmer theory," which has so forcibly impressed us.

The "Third" (Reason) concludes by assuming that "it is *absurd* to suppose it possible for any current to exist in the mouth capable of decomposing tooth-tissue." Now, although "we" do not admit the truth of this position, yet as "we" have never said that such *decomposing* current did exist, it would be manifestly *more absurd* for us to combat this unreasonable reason.

Fourth (Reason), (N.B.) "If a gold filling in a tooth is capable of developing a current *sufficient to excite the disorganization of bone* (the italics are mine), what must be the effect of a partial gold plate in the mouth? It might readily be supposed (according to the new doctrine) (! ! ! !) (the admiration marks are mine) to be as bad as a charge of dynamite."

This is such a perfect "Krupp gun" that when it was fired off I cannot see how any "New Departure" remained to receive the other seven shots! I should have thought it would have instantly become the "New Departed!" and even now, recognizing my incompetency to offer any adequately argumentative reply, I propose leaving "Reason No. 4," with its empty muzzle pointed at the principles I advocate, fondly trusting that its *great weight* alone will be sufficient to denote that it is a fit companion to its "Big gun" prototype, that loomed so frowningly (*and yet so harmlessly*) in Machinery Hall, during the grand Centennial!

(To be continued.)

ORAL ELECTRICITY.

BY HENRY S. CHASE, D.D.S., M.D., ST. LOUIS.

At the October meeting of the New York Odontological Society, W. C. Barrett, M.D.S., essayist, erected a flimsy structure, which he called the "New Departure," and then proceeded to tear it to pieces. He says, "The new doctrines call upon us to believe that electricity, *per se*, is the destroying force" of dentos, or other positive element.

The "New Departure" experiments prove that it is *chemical action* that destroys dentos. That chemical action is greatly *intensified* by the added influence of galvanism, and that it is *not* electricity, *per se*, that destroys dentos.

Our experiments prove that when a cube of dentos placed in a weak acid loses *one* grain of weight in a given time, a similar one having had a large tin plug inserted will lose three grains in weight in the same time, and one with an amalgam plug of the same size, four grains; and one with a gold plug, six grains, or dentine cube, not plugged, lost one grain; dentine cube, with tin plug, lost three grains; dentine cube, with amalgam plug, lost four grains; dentine cube, with gold plug, lost six grains.

We never said that the destroying force here was the electric current. But we always have said that the formation of the battery put the positive element in jeopardy; and that the more negative the element of which the plug was made, so *in proportion* is increased the danger to the dentos.

Gold is a better conductor of electricity than any other filling material.

The best conductor makes the strongest battery, other things being equal.

Gold is the most negative of our metallic fillings. Gold, then, being the most negative substance and the best conductor, makes the strongest battery.

Gold, then, united to dentos, in the presence of a weak acid, causes this acid to act upon the dentos from five to six times as much in a given time as it would if there was no gold present, and aids notably in the *elimination* of the electricity thus increasedly generated.

If the presence of a current of electricity is denied, or of galvanic action between united gold and dentos, in the presence of an acid, it makes no difference with the fact that a greatly increased weight of dentos is lost by the presence of the gold.

We have said that we find *by experiment* that all of our metallic fillings have a similar effect, only less in degree. Our experiments prove that oxychloride of zinc (so called) prevents a dentos cube from being attacked by a weak acid. Now for the reason:

The dentos is negative to oxychloride of zinc, or oxychloride of zinc is positive to dentos, and so the "oxychloride" itself is dissolved or loses in weight. The direction of the current of electricity is reversed, and the oxychloride plug is attacked by the acid, instead of the dentos.

All these experiments prove the existence of galvanism, and that this *intensifies* chemical action.

The whole subject is very simple to a willing learner. All of the foregoing has been written several times before, and so has the following. Galvanic action in the mouth seems most likely to be evoked in the presence of an acid condition of the fluids. This action is most likely to take place under and around *leaky* fillings, between the teeth, and in any other location where food would be undisturbed,—as at the margins of inflamed gums,—provided, metallic fillings occupy these situations.

Our experiments prove that no metallic filling is in electrical harmony with dentos.

Our experiments prove that gold is least of all metals in harmony with dentos.

Experiments prove that a *leaky* gold plug is worse for the dentos than a leaky plug of any other filling material at present in use.

It is astonishing that any dentists are unwilling to make use of knowledge gained by experiment, but shut their eyes, and shout, "Great is Gold! Great is Gold!" Fearing that their god may cease to be worshiped.

Why not practice on the *eclectic* system, without prejudice or partiality? There are thousands of mouths where a good amalgam or tin filling would be greatly better in proximate cavities than gold. There are thousands of mouths where water-tight gold plugs on *articulating surfaces* would be just as useful and look better than other fillings.

There are large numbers of cases where the *modern white cement* would *look* better in front teeth, and save the dentos from decay better than gold. There are *millions* of mouths where amalgams or tin are the only suitable fillings for the molars and bicuspids, because these mouths are not accustomed to habitual cleanliness.

The proceedings of the New York Odontological Society in October, 1878, as published in the *Oral Science Magazine*, I hope may be republished in the DENTAL COSMOS for wider circulation. The whole discussion seems to be for the purpose of putting an end to the "New Departure." The discussion is no discussion. It amounts only to this: "The 'New Departure' principles are not true; we don't believe in it; we won't practice on its asserted truths; we are disgusted with it; we don't wish to hear anything more about it. Amen."

But there are ten thousand dentists in the United States whose *experiences* correspond with the facts and theories of the New Departure.

Whatever a few men here and there may do or say to protect and exalt their golden idol, it will ultimately cease to be the "chief" in dental operations. Practice will be modified quietly, even by those now in the strongest opposition.

The "Apostles of the New Departure" will be satisfied with the triumph of TRUTH, whatever idols it may displace.

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

(Continued from page 80.)

IX.

MATERIALS AND APPLICATION OF FIXTURES.—THE USE OF SPRINGS AND WIRE.

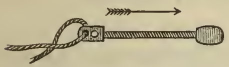
ALTHOUGH there may be cases which justify the formation of a pit, or the placing of a small screw in a tooth in order to secure firmness of apparatus, it should not be a general practice. So the formation of slight hollows or grooves in some part of the crowns (never at the necks) for anchorage should only be resorted to as a last expedient. Frequently difficulties, which at first seem insurmountable, may be overcome, more or less easily, by a little study. While steadily keeping scientific principles in mind, and avoiding hobbies, it is well to exercise common sense, and resort to invention in the details of regulating teeth, in order to avoid failure and injury. We shall find that a little variation in little things is sometimes of great consequence. A little melted shellac dropped on the end of a screw or bolt, or on some sharp angle of a fixture; a little thimble or ball of metal or hard rubber, or even of "Hill's stopping," will often prevent irritation, which otherwise might prove a great annoyance to the patient, possibly changing that which might be a failure to success.

Having heretofore dwelt sufficiently upon apparatus made entirely of metal, in illustration of the principles involved, so that inventive minds may easily make numerous variations for different cases, we will now consider the application of the intermittent principle by the use of strings, wire, and hard rubber, more or less associated in the construction of apparatus.

Silk, linen, or other strong fibers, or "horse-hair" wire, of platinum or gold, may be used. There are many cases in which the use of strings or wire is desirable, not only for æsthetic consideration, but also for simplifying the apparatus as well as the operation. To illustrate by word or by diagrams all the modifications of this sort of apparatus, which variation of circumstances may call for, would extend my papers to an indefinite length. A few diagrams with explanations, briefly setting forth the principles upon which they may be made to act, are all that are necessary. Strings or wire, as circumstances may indicate, may be attached to the teeth, just as heretofore done, in combination with elastic rubber. These may be secured to some form of screw connected with some point of anchorage, a clamp or band, or metallic or hard rubber plate, so that, by tightening the screw, the strings or wire can be made to draw upon the teeth in the direction desired, varying according to circumstances. By passing the string or wire around other teeth, or through arms projected from the anchorage, or through or around points on a plate, the force may be exerted so as to draw in almost opposite directions, and even so as to cause different teeth to move in different directions by the use of the same string or wire. It will be understood, however, that while the twisting of a thread by turning of the screw (Fig. 47) will be borne, a wire so twisted would break. This, however, may be easily avoided by the interposition of a lug made of a piece of metal bent at right angles (Fig. 48), or by a small swivel-joint (Fig.

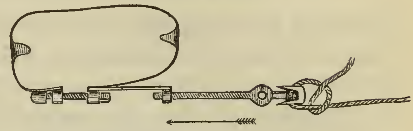
49), which by care and the aid of pliers to hold it while the screw is turned, will prevent the wire from being twisted.

FIG. 47.



Drag-bolt, with a non-irritant thimble attached.

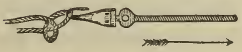
FIG. 48.



Right angle lug and drag-screw, with anchor clamp.

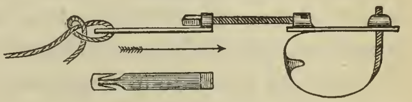
As will be plainly seen, fixtures constructed upon this plan, and acting upon this principle, may be useful, if managed with skill, in moving teeth in almost any direction. The variation in the position, as well as in the construction of the "generator" of forces (the screw) may be as different as need be. The attachments of the strings or wires may be made by means of a hole drilled through the head of the screw, as shown in Fig. 47, but oftentimes better by winding it about a single or double crochet-hook like place, formed in some part of it, somewhat as shown in Figs. 48 and 50, which may be tightened by the turning of the screw, by means of a bench-key (see Figs. 44, 45, February DENTAL COSMOS); but generally better by a No. 6 lever (Fig. 45) used in a hole drilled through some part of the screw—usually the head.

FIG. 49.



Single hook and swivel drag-screw.

FIG. 50.



Double hook drag-screw connected with an anchor clamp.

The intermittent principle of action may sometimes be obtained by the use of a lever in connection with a ratchet, on the principle of teeth or movable pegs, but generally better by the use of some screw attachment.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular meeting, held at the residence of Dr. Charles Miller, 331 Madison Avenue, on Tuesday evening, December 17, 1878.

President A. L. Northrop in the chair.

Dr. Norman W. Kingsley exhibited and described some improvements in laboratory apparatuses, as follows:

A visitor to my laboratory suggested that I should bring before this society some appliances which I use, and which are known to but a limited circle.

Turning Lathes.—Some months since, in rearranging my laboratory, I felt the need of a lathe which would enable me to do some things outside of mere dentistry, and in looking through the various shops for such as are made for jewelers or amateur machinists, I selected one made by the Useful Machinery Company, and patented in December a year ago.

They make three sizes—the second or medium size being the one I show you to-night.

It is mounted as you will see upon a black walnut table with iron frame, with a heavy driving-wheel and treadle.

The bed-plate of the lathe is twenty-four inches long, and the distance between the chuck and the tail-stock is about fourteen inches. The center of the chuck is nearly four inches above the bed-plate, thus giving a capacity to turn anything of seven inches in diameter and fourteen inches long.

The upper works are nickel-plated, and the whole is an ornamental piece of furniture.

One advantage which I find in this lathe is that it has hollow mandrels, which enable me to pass through a rod or piece of tubing of any length, and turn it at any point that I desire to secure it.

I find the machine strong, stiff, and what is of the utmost consequence, perfectly true.

The head-stock is so arranged that it is in itself as admirably adapted a dental lathe as any made expressly for dentists. And with this in view the makers have prepared chucks, spindles, tapering screws, and other devices for dentists' use. For general use I first obtained an "Amateur Chuck," which is certainly an excellent chuck, but a little heavy for this size lathe. Subsequently I procured the chuck made by the manufacturers of the lathe, which I like much better, and it is so fine an instrument that it will secure a hair.

I believe that, as a turning lathe, for all the purposes a dentist will be likely to need one, it is the best which has been produced.

I can conceive of no more useful machine outside of the absolute needs of a dentist than such an instrument. Aside from its practical application, it stimulates in those who have access to it a love for mechanics, which lie at the foundation of our art, and wakens up an ingenuity which might otherwise lie dormant. To those who have a permanent laboratory I would recommend that the lathe be mounted as mine is. I have a heavy oak plank anchored at one end to the brick wall, and the other resting on a wooden column some twelve by eighteen inches square. Upon this column, which goes down to the ground, I hung my driving-wheel, thus securing a steadiness of movement and absolute freedom from jar, so essential to precision in workmanship.

Spindles.—These spindles which I now show you are used with the "United States" Dental Lathe, and are of various sizes for mounting corundum wheels. They are the result of one of the uses of the turning lathe, and are made by the students in my laboratory as follows:

A wooden pattern is turned with shoulder or arbor as desired, moulded in sand, and cast with brass; then turned up in the lathe. For convenience the thread and nut are of iron, using for that purpose the most convenient screw and nut which is accessible. In these cases we used some carriage bolts, cutting them in two and inserting the threaded end in the sand mould previous to casting. The melted brass will readily flow around and secure it, thus adding in a very simple way, and with trifling expense, a considerable variety to our appliances.

You will very naturally ask, How is the brass melted? as dentists rarely have the conveniences.

Fletcher's Furnace.—I show you here one of Fletcher's furnaces, with a crucible that will hold from six to eight ounces of brass or other metal. The heat required is obtained from gas, and the blast is with a small foot bellows. With this furnace I can melt a few ounces of brass in a few minutes.

I have with it melted an ounce of gold and poured it into an ingot mould in two minutes and fifteen seconds from the time the gold was put into the cold crucible.

Bunsen Burners.—I have been experimenting somewhat with gas-burners for heating purposes, and I find that nearly all the Bunsen burners in the market are faulty. There is from the beginning an imperfect combustion, as any one can readily see by the coating of soot or unconsumed carbon which collects upon the bottom of anything continually heated by them. The principle of the Bunsen burner is that discovered by Sir Humphry Davy, and embodied in the miner's safety lamp, which is, that flame will not pass through wire gauze.

The wire gauze is a combination of short tubes. If the meshes of the gauze were large the flame would pass, showing a relation between the diameter and the length of the tube. In the Bunsen burner perfect combustion results from the increased supply of oxygen furnished by the admission and mixing of air with the gas before it is ignited. In the perfect Bunsen burner the gas will burn at the top of the tube, and the flame will not drop to the bottom where the gas outlet is. With most Bunsen burners the gas is constantly catching fire below, and the surrounding atmosphere immediately becomes foul. A burner to be perfect must have a tube with the length, diameter, outlet for the gas, and inlet for the air, all in the right proportion to each other. A perfect burner will give a clear blue cone of flame, almost invisible by daylight, with absolutely perfect combustion. Take such a burner and enlarge the gas supply, and imperfect combustion will follow; or diminish the air supply, and the same result will follow. With the same burner, if you shorten the tube, or increase its diameter, the flame will drop.

I made for my vulcanizers and celluloid heaters a combination of Bunsen burners, and the combustion is so perfect that now, after several months' use, the bottoms of the heaters are as free from soot as the day they were first used.

Bracket Lamp.—I have here, to show you, a combination of such burners attached to the bracket table at my operating chair, with which I keep warm or anneal my gold for filling. The combustion is perfect, and the expense of gas is so slight that I doubt if it could be computed. Prior to the use of this I found that my monthly bill for alcohol for the same purpose was nearly equal to the expense of gas for my entire laboratory.

These burners will not give a flame of more than one half or three-quarters of an inch in height. Over one is placed the tray for warming gold, while the other rises at the side with the flame exposed for annealing purposes.

In these burners the gas outlet is from a hole no larger than a fine needle; the tubes are small in diameter, and high in proportion. The result is they cannot catch fire at the gas outlet, even by tipping them bottom upwards.

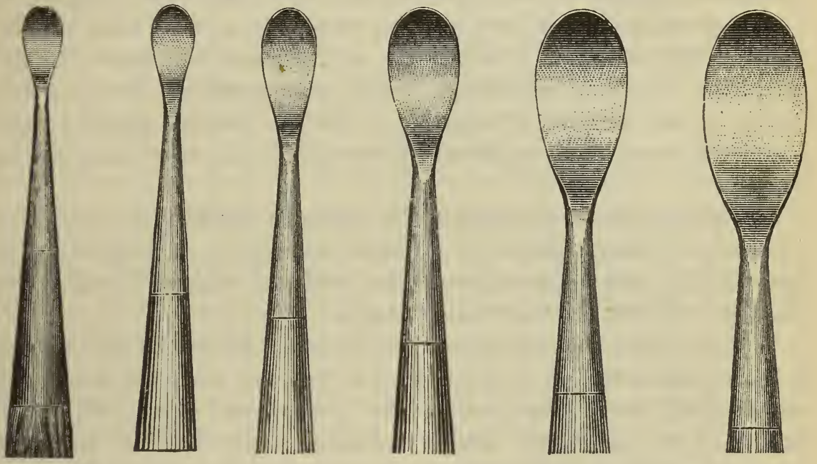
Flasks.—I have some flasks of my own make for rubber or celluloid work, which I think are an improvement.

They are a modification of the Star flask. In my experience I found the Star flask was not deep enough in the shallow section, and the covers were easily warped, so that in a little time they became useless. Besides, the covers being different, and the bolts being special bolts, added to the objections.

In my flask I have thickened the cover, and made it interchange-able; it answers for either side. The bolts are one-quarter inch carriage bolts, two and one-half inches long. They can be found in any hardware shop in the country, and I bought these for ninety cents a hundred.

The guiding pins are made long, so that they will answer for small cases of celluloid equally with special flasks.

Plaster Carvers and Scrapers.—I have here some instruments such as I have been using for many years, and for their purpose they are invaluable.



I call them my "spoons" from their general resemblance to a spoon. They have thin, knife-edged blades, and for carving plaster in the many cases where a straight blade is not adapted, they are superior to any other form.

They are also of equal value in carving, scraping, or cleaning up rubber or celluloid work. The scrapers which are in the market for that purpose are so clumsy, that I wonder they find any sale.

I use these of all sizes, from a blade one-eighth of an inch in width up to half an inch.

Head-Rests.—With the advent of improved dental chairs, has come the effort to improve upon the simple head-rest of former days.

I doubt very much if the complicated provision for so many twists of the heads of our patients is at all needed, and I am not sure but they provoke more harm than good.

Becoming disgusted a couple of years since with the head-rest upon the chair I was using, I made a study of the head-rests in the market, and also of the needs of my patients and my own requirements, and upon full reflection, as well as from the experience of many others with whom I have conversed, I came to these conclusions.

But two provisions are required of a head-rest on a dental chair. One for the forward and backward movement of the patient's head, and the other to accommodate the varying lengths of spinal columns of different patients.

No lateral movement is at all necessary. No dentist uses such a movement to advantage. If he stands against the shoulder of the patient he cannot get the head nearer to him with advantage by pulling the head-rest laterally; every such movement makes him and the patient worse off. All twisting of the face off from a line with the spinal column will take place on the head cushion any way.

The essential forward and back movement in all head-rests is upon substantially the same principle, viz., a hinge, and is sufficient for the purpose. The only advantage which one possesses over another being in the method of securing it in the desired position; the simpler movements being always preferable to the more complicated ones.

The other need, of elevation of the head-rest, has been accomplished in nearly all dental chairs by the same means, viz., a straight rod or bar working perpendicularly on a line with the back of the chair, on the top of which the head-rest is hinged.

It is just here that the whole trouble lies. When the rod is down a short person sitting in the chair will find the rest convenient and comfortable; but change now to a tall person, and every inch of elevation of the head-rest carries it farther away from the patient's head; therefore a compensating movement of the rest must be provided, and by various devices the rest is made to advance horizontally until it meets the patient's head.

This movement I find to be useless, and the complicated mechanism now in the market to carry the rest to the head, I believe to be unnecessary. I have made a careful study of the curves of the human figure, and in a head-rest which I here show you I have arrived at the same result by the most simple means. By placing the head-rest on top of a *curved* rod or bar the last difficulty is entirely obviated. This bar is bent to a curve to conform to the average contour of human shoulders, and was modeled from actual practice. The forward and back movement is controlled by a curved ratchet and a spring, and can be operated with one hand.

I have never found a patient, even with extreme curved shoulders, who did not find a rest for the head in it which was perfectly comfortable. It is a new principle, and I believe embodies the true principle of a simple, easily managed, and comfortable head-rest, adapted to all our needs. The ideal head-rest and the ideal dental chair of the future is the one which provides for our daily wants in the simplest and most direct manner, and ignores a rare though possible contingency, which, if provided for, requires complicated machinery.

A paper on "Caries of the Human Teeth,"* by Dr. Frank Abbott, of New York, was read by the author.

Prof. Carl Heitzmann, New York. We have just listened to a paper which, in my judgment, is of the greatest importance. The essential point at which Dr. Abbott arrives is that John Hunter's doctrine of the inflammatory character of caries was correct. Certainly Hunter did not prove his hypothesis, nor had he the means to do so; but, you know, one of the peculiarities of genius is that it often arrives at truth by methods not dependent on the slower operations of lesser minds. Since it is settled that the tooth is a living organ, reaction against injury should be, and is, one of its properties; and the amount of this reaction, Dr. Abbott claims, is determined by the relative amount of living matter contained in the tooth-tissues. The question, "What is inflammation?" has occupied examining minds for many years. The older observers, when examining inflamed living tissues, saw the current of blood in the capillaries become slower and slower, until finally stasis in these vessels was produced. At the same time exudation occurred, inundating the surrounding tissues. Hence they concluded that blood, blood-vessels, and exudation were the essential constituents of the inflammatory process. But, in the fifth decade of our century, Hiss succeeded in producing inflammation in the cornea of the eye. Also, in 1848, wonderful experiments were made in London by Redfern, upon the cartilage of the knee-joint of various animals. Hutob also produced inflammation in cartilage. More recently, Cohnheim's corpuscular theory became the governing one. It is to Stricker, of Vienna, that we owe proof that this new theory is incorrect. He has shown us that most of the former doctrines contained each its grain of truth, and that the true solution of the problem may be found in a combination of these truths. Thus, we now know that for inflammatory processes we must have a tissue which contains blood-vessels; also, that the doctrine of Virchow, that the cells of these tissues finally break down and produce inflammatory elements, is correct; and finally, that in certain conditions of the inflammatory process, and particularly in suppuration, emigration of blood-corpuscles occurs. I have spent much time in the study of inflammation, using for experiment that tissue which seems to have been somewhat neglected since Redfern's time,—cartilage. I injured living cartilage with hot irons. I observed that the uninjured portion reacted only by producing a small zone of medullary elements around the injured place; that is, the cartilage injured had been reduced to its juvenile or medullary condition. After much consideration, I arrived at the conclusion that we may justly style this action of cartilage an inflammatory process; or, in other words, we may say that inflammation in its first or earliest stage—its mildest degree—consists in a reduction of tissue to its medullary condition. Owing to the absence of nourishing material (since the blood-vessels are here situated at some distance from the focus of injury), new medullary elements are not produced in cartilage inflammation, and hence there is no continuation of the inflammatory formations or process, as there would be under other circumstances. In Dr. Abbott's specimens of teeth we see the same process as that occurring in cartilage under similar conditions. Here, as in cartilage, the nourishing vessels are situated at some distance from the focus of injury; hence, as in cartilage, injury, either chemical or mechanical, of the tooth-tissue is followed by the breaking down of that tissue into its medullary elements, without further continuation of the inflammatory process, because of the absence of nourishing material at the point of injury. Therefore, if we are justified in calling this process inflammatory when it occurs in cartilage, we are also correct in giving it the same title when it happens in tooth-tissues.

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* See DENTAL COSMOS for February, March, and April, 1879.

It has been asked, "Why should dentists concern themselves with these questions?" But I do not think there are any here to-night who will ask that question. It is true that, in my judgment, a complete knowledge of histology is not necessary in order that one may do first-class dental work; but it is necessary to him who desires to become a scientific dentist. The dentist of past times knew nothing of the presence of living matter in a tooth, although he knew that a bullet-wound in the tusk of an elephant could heal. One would think, to-day, that this single instance must have clearly indicated the truth to any inquiring mind; but it was not so. Our ancestors remained in contented ignorance of the constitution and nature of the tissues upon which they worked daily. But it seems as though this state of things is now changed, and science in dentistry is about to become a fact. In this country dentistry has reached its greatest perfection with regard to technical work; and I think I am justified in saying that we also possess the means and the brains to raise the scientific position of the profession to a like elevation. I think it is the duty of every dentist to do something toward this end. If he cannot himself undertake original investigations, then let him at least satisfy himself of the truth or falsehood in the researches of others.

Dr. George S. Allan, New York. Dr. Abbott has presented some ideas which, if proved correct, will entirely destroy some of the present doctrines of the causes of dental caries. Three principal theories have been and are in vogue: one, that caries is a pathological change, produced systemically; another, that caries simply is an outwardly-produced chemical change in tooth-substance; and a third, that caries is caused by the destructive growth in the tubuli of minute vegetable organisms called leptothrix. As I understand Dr. Abbott, he adopts the chemical theory, to which he adds pathological conditions which aggravate the carious progress. If we examine sections of teeth as described by Dr. Abbott, we find his description exact in many particulars, but, I am disposed to think, not so in others. In a tooth we find "formed material" as well as protoplasm,—formed material which, while the offspring of protoplasm, is totally different from that substance. Dr. Abbott seems to claim that, when this formed material is chemically disintegrated, the protoplasm in the tooth has the power of giving to its constituents a new lease of life, and reinstating the whole in its original condition of protoplasm. Or, in other words, he seems to claim that the organic material proliferates under acid action, and, as the lime-salts are dissolved out, grows and spreads in the space left, aggravating the carious condition in much the same manner as a cancerous growth disintegrates and breaks down healthy tissues by which it is inclosed. I do not say that he cannot prove his position, but I must regard the theory with great caution until it is so proved. Tomes held that, as caries proceeds, the dental tubuli become filled up before it, probably with calcareous material. If this is so (and the tubes certainly are, in such cases, stopped up, at least in great measure), whence does the protoplasmic growth mentioned by Dr. Abbott draw its source of life? For the stopping of the tubuli occurs between the seat of disease and any source of nourishment. I have seen many cases of caries in dead teeth, in which the process was, in almost all respects, identical with that in living teeth. This, if Dr. Abbott's theory is correct, will require some further explanation from him. Again, if we take a perpendicular section of the skin, stain it with carmine, and examine it under the microscope, we shall find that the proportionate amounts of protoplasm and formed material vary in direct ratio with the distance from the source of nourishment; that part of the section at the dermal surface showing almost entire absence of protoplasm, while the portion nearest the nourishing source shows very little formed material. In the dental tissues the same relative conditions exist, and it is difficult for me to believe that protoplasm can here proliferate as Dr. Abbott seems to infer, cut off, as it is, almost entirely from the circulating fluids of the body.

Dr. Abbott. Dr. Allan is mistaken. I never made such a claim. On the other hand, I have declared that such views were incorrect.

Dr. Allan. Perhaps I derived the inference more from the diagrams than from the doctor's statements. Formed material does not become stained by carmine. Protoplasm must exist in the tooth-substance before decalcification, or else its after-appearance there is a result of the chemical action of the acids on the tooth-substance. If this is not so, the protoplasm cannot fill up the spaces as shown in the diagrams.

Dr. Abbott. This section shows the protoplasm surrounded by the tooth-substance, which latter becomes broken down and forms the structures shown.

Dr. Allan. And which you call protoplasm?

Dr. Abbott. It is a protoplasmic mass. The living matter in protoplasm is small in comparison to the whole mass. The diagram shows large protoplasmic masses, but only a small quantity of living matter. As an illustration take the amœba. A large portion of that organism is not alive. Much of it is fluid, and fluids never have life. Yet we can discover, with high powers, the really living protoplasm in the substance of that protoplasmic mass called amœba.

Dr. Allan. Formed material is the offspring of protoplasm, is totally different from it in structure and function, and cannot be reconverted into protoplasm except by passage through an animal organism in the regular course of nutrition. It seems to me that Dr. Abbott's remarks indicate that protoplasm is formed in the tooth, in large mass, by the action of chemism. This cannot be, for protoplasm exists in the developed tooth only as formed material, and cannot again become protoplasm except through being changed in an animal organism by the processes of nutrition.

Dr. J. B. Rich, New York. We may heartily congratulate ourselves upon the fact that, after many years of empty boasting about the scientific status of dentistry, an attempt is here made to really establish the profession on a scientific basis. Whether the paper to which we have just listened be full of truth or error, it is a great step in the direction of scientific dental progress. Hitherto dentists have seemed content to leave the scientific portion of their attainments to those entirely unconnected with the profession; but a better and more hopeful state of things seems here inaugurated, for dentists themselves are now investigating the basal principles of their profession. Upon this I heartily congratulate dentistry.

Adjourned.

ALUMNI ASSOCIATION OF THE BOSTON DENTAL COLLEGE.

At the anual meeting of the Alumni Association of the Boston Dental College, held at the college building, No. 485 Tremont Street, Boston, March 5, 1879, the following gentlemen were elected officers for the coming year:

President.—Dr. C. H. Osgood, Boston, Mass.

First Vice-President.—Dr. L. B. Fenderson, South Boston, Mass.

Second Vice-President.—Dr. G. A. Young, Concord, N. H.

Secretary.—Dr. H. W. Coburn, Lowell, Mass.

Treasurer.—Dr. G. C. Ainsworth, Boston, Mass.

Executive Committee.—Dr. R. R. Andrews, Cambridge; Dr. T. W. Clements, Brookline, Mass.; Dr. F. F. Gage, Boston, Mass.

H. W. Coburn, *Secretary.*

ALUMNI ASSOCIATION PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

The ninth annual meeting of the Alumni Association of Pennsylvania College of Dental Surgery was held on Thursday and Friday, February 27 and 28, 1879, in the college hall.

The officers chosen for the ensuing year are as follows:

President.—Dr. S. H. Guilford.

Vice-President.—Dr. G. W. Adams.

Recording Secretary.—Dr. J. W. Adams.

Corresponding Secretary.—Dr. W. R. Millard.

Treasurer.—Dr. Annie D. Ramborger.

Executive Committee.—Dr. E. H. Neall, chairman; Dr. H. C. Register, Dr. W. R. Millard, Dr. R. Huey, Dr. G. W. Klump.

Drs. T. M. Heiss and T. W. Buckingham were elected delegates to the Pennsylvania State Dental Society and American Dental Convention.

J. W. Adams, *Secretary.*

BALTIMORE COLLEGE OF DENTAL SURGERY.*

The thirty-ninth annual commencement of the Baltimore College of Dental Surgery was held in the Academy of Music, Baltimore, Thursday evening, March 6, 1879.

An address was delivered by Frank B. Perry, of the graduating class, the valedictory by Rev. Alexander W. Weddell, D.D.

The number of matriculates for the session was eighty-two.

The degree of D.D.S. was conferred on the following members of the graduating class by Professor F. J. S. Gorgas, Dean:

Name.	Residence.	Thesis.
A. M. I. Hein	Germany	The Teeth.
A. H. Grieffenhagen	Germany	Extraction of Teeth.
Samuel E. Jones	Texas	Dental Caries.
Frank P. Bernard	Pennsylvania	Special Senses.

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* The Maryland Dental College and the Baltimore College of Dental Surgery have been merged into one, under the name of the latter. Dr. F. J. S. Gorgas is the Dean of the Faculty.

NAME.	RESIDENCE.	THESIS.
William R. Laws	Maryland	Irregularity of the Teeth.
Juan B. Lombard	Cuba	Stomatitis.
Eduardo Lombard	Cuba	Aneurisms of the Tongue.
B. Jones Quattlebaum	South Carolina	Alveolar Abscess.
William R. Renalds	Virginia	Dental Caries.
James A. Colvin	Virginia	First Dentition.
Laurence S. Wolfe	South Carolina	Stomatitis.
Charles M. N. Latimer	District of Columbia	The Teeth of Man.
Andreas C. Ferrari	Russia	Treatment of Dental Pulp.
J. Allen Patterson	South Carolina	Treatment of Dental Pulp.
Gordon White	Tennessee	Neuralgia.
Frank B. Perry	Virginia	Treatment of Dental Pulp.
Arthur M. Rice	Connecticut	Treatment of Dental Pulp.
John C. Wilkerson	Alabama	Dental Caries.
Robert P. Fletcher	Virginia	Treatment of Dental Pulp.
John M. Philips	North Carolina	Treatment of Dental Pulp.
Richard H. Billingslea	Maryland	Maxillary Sinus.
Thomas S. Jordan	Alabama	Dental Hygiene.
William M. Rawlinson	South Carolina	Filling Teeth.
Thomas G. Morrow	Maryland	Circulation of Blood.
Richard Grady	Maryland	Treatment of Pulp.
John P. Coult	New Jersey	Treatment of Pulp.
Charles Eckhardt	Louisiana	Odontalgia.
William H. Weems	Texas	Treatment of Pulp.
Francis S. Harris	North Carolina	The Care of Children's Teeth.
Edwin D. Akers	Pennsylvania	Inflammation of Gums.
T. Disbrow Stone	New York	Caries.
Elroy F. Cross	Massachusetts	Treatment of Pulp.
Edmund C. Bryant	Maine	Treatment of Pulp.
Edwin J. Parkison	Maryland	Salivary Calculus.
Alfred F. King	New York	The Six-Year Molars.
Hall Lewis	District of Columbia	Treatment of Pulp.
Samuel M. Roach	Georgia	Filling Teeth.
Edward Flannigan	Maryland	Artistic Dentistry.
Richard B. Winder, Jr.	Maryland	
John A. Millard	France	
Henry Bentley	Connecticut	

OHIO COLLEGE OF DENTAL SURGERY.

THE thirty-third annual commencement of the Ohio College of Dental Surgery was held in the Welsh Church, Cincinnati, Wednesday evening, March 5, 1879.

The annual address was delivered by Dr. W. H. Morgan, of Tennessee; the valedictory by Dr. R. G. Richter, of Wisconsin.

The number of matriculates for the session was fifty.

The degree of D.D.S. was conferred on the following graduates:

NAME.	RESIDENCE.	THESIS.
W. N. Alsop	Kentucky	General Circulation of the Blood.
E. W. Anderson	Indiana	Operative Dentistry.
Otto Arnold	Ohio	Conservative Treatment of Dental Pulp.
T. S. Brown	Pennsylvania	Artificial Dentures.
Allen Budd	Indiana	Gold.
Perry Burgen	Kentucky	Conservative Treatment of Dental Pulp.
W. Hart Cameron	Ohio	Gold as a Base for Artificial Teeth.
Oscar Heise	Ohio	Conservative Treatment of Dental Pulp.
H. E. Highlands	Ohio	Conservative Treatment of Dental Pulp.

Name.	Residence.	Thesis.
W. H. H. Hunter	Ohio	Conservative Treatment of Dental Pulp.
H. P. Kelly	Ohio	The Antrum and its Diseases.
C. W. Moffett	Kentucky	Physiology.
W. F. Magie	Ohio	Caries of the Teeth.
H. L. Moore	Ohio	Preparing Cavities, Filling Teeth, and Materials Used.
C. J. Phillips	Pennsylvania	Conservative Treatment of Dental Pulp.
W. S. Rawles	Indiana	The Circulatory System.
W. F. Redman	Kentucky	Dental Caries.
R. G. Richter	Wisconsin	Conservative Treatment of Dental Pulp.
A. G. Rose	Ohio	Conservative Treatment of Dental Pulp.
I. Sanger	California	Operative Dentistry.
J. B. Stevenson	Ohio	Digestion.
James Stockton	Ohio	Alveolar Abscess.
C. W. Wardle	Ohio	Digestion.
J. L. Young	Tennessee	Caries of the Teeth.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

The twenty-third annual commencement of the Pennsylvania College of Dental Surgery was held at the Academy of Music, Philadelphia, Friday evening, February 28, 1879.

The address to the graduates was delivered by Professor J. Ewing Mears, M.D.; the valedictory by H. Newton Young, D.D.S.

The number of matriculates for the session was ninety-four, anatomical students, twenty-one.

The degree of D.D.S. was conferred on the following graduates:

Name.	Residence.	Thesis.
George B. Barnes	New York	The Pulp.
William J. Bartlum	Florida	Extracting.
Attillio Bauer	Italy	Replantation of the Teeth.
Alonzo P. Beale	Pennsylvania	Artificial Dentures.
Robert R. Bourne	Tennessee	Conservative Treatment of the Pulp.
Samuel A. Bowman	Pennsylvania	Respiration.
I. Norman Broomell	Pennsylvania	Dental Caries, Effects and Treatment
G. Carleton Brown	New Jersey	Evolution.
J. Hammond Campbell	Virginia	Diseases of Maxillary Sinus.
J. Calvin Chamberlin	Pennsylvania	Inflammation of the Pulp.
Eugene L. Clifford	Louisiana	Antral Abscess.
G. C. Cludius	Germany	On Dental Ceramic Art.
William J. Conrad	North Carolina	Conservative Treatment of the Dental Pulp.
P. B. Connor	South Carolina	Filling Teeth.
William A. Cortwright	Pennsylvania	Salivary Calculus.
Frank J. Eckert	Pennsylvania	Conservative Treatment of the Pulp.
D. Wilmot Gordon	Pennsylvania	Digestion.
Juan Guirola	Cuba	Periodontitis.
Oliver W. Hall	Pennsylvania	Diseases of the Maxillary Sinus.
William F. Henson	Pennsylvania	The Oral Cavity.
F. L. Hollister	Pennsylvania	Mechanical Dentistry.
J. W. Isenberg	Pennsylvania	Dentine, its Friends and Enemies.
Courtlen King	Pennsylvania	Exposed Pulp.
Charles F. Lewis	Vermont	Salivary Glands.
Louis Loehr	Germany	Abscesses.
George H. Lutz	Pennsylvania	Dental Etiquette.

NAME.	RESIDENCE.	THESIS.
Federico J. Merlano	South America	Materials with which Teeth are Filled.
Valentin A. Pareja	South America	Dental Caries.
Clinton B. Parker	New York	The Relation of Physiognomy to Mechanical Dentistry.
W. D. Patterson	Iowa	Filling Teeth and Filling Materials.
Antonio F. Piron	Hayti	Circulation of the Blood.
Lewis A. Reading	New Jersey	Alveolar Abscess.
G. E. Shollenberger	Pennsylvania	Salivary Calculus.
W. T. Smith	Maryland	Dentistry.
Clarence E. Stacks	New York	Materials for Filling.
A. Penn Strayer	Pennsylvania	Odontalgia.
E. N. Stump	Pennsylvania	Periostitis.
Paul J. Styer	New Jersey	The Oral Cavity.
W. E. Tizzard	Ohio	Salivary Calculus and its Treatment.
Benj. Franklin Williams	Pennsylvania	Periodontitis.
Oscar Wolfe	Switzerland	Pivot Teeth.
H. Newton Young	New Jersey	Periodontitis.

PHILADELPHIA DENTAL COLLEGE.

THE sixteenth annual commencement of the Philadelphia Dental College was held at the Academy of Music, Philadelphia, Thursday evening, February 27, 1879.

The address to the graduates was delivered by Professor S. B. Howell, M. D.

Number of matriculates for the session, one hundred and thirteen.

The degree of D.D.S. was conferred on the following graduates:

NAME.	RESIDENCE.	THESIS.
Albert Agramonte	Cuba	Conservative Treatment of the Pulp.
John K. Ahl	Pennsylvania	Digestion.
R. Barnett, M.D., M.R.C.S.	Ireland	Operative Dentistry.
Frank L. Bassett	Pennsylvania	Conservative Treatment of the Pulp.
Charles W. Beacom	Pennsylvania	Conservative Treatment of the Pulp.
J. H. Beals	Massachusetts	Blood and Organs of Circulation.
William Berkowitz	Pennsylvania	Disease of the Maxillary Sinus.
Adolph E. Birgfeld	Germany	Disease of the Antrum Highmorianum.
L. L. Buckland, C.E.	Rhode Island	Dental Education.
Isaac M. Case	Maine	Neuralgia.
William H. Colgrove	New York	Conservative Treatment of the Pulp.
Charles C. Conwell	Nevada	Alveolo-Dental Abscess.
Edward P. Day	Pennsylvania	Construction of Celluloid Dentures.
Robert T. Delano	Massachusetts	Conservative Treatment of the Pulp.
Joachim Dioré	Mauritius	Treatment of the Teeth.
Charles B. Dixon	Pennsylvania	Treatment of the Deciduous Teeth.
Frank R. Faber	Pennsylvania	Conservative Treatment of the Pulp.
P. M. George	Georgia	Taking Impressions of the Mouth.
A. W. Gray	Tennessee	Circulation of the Blood.
Edward W. Hiteshew	Pennsylvania	Oral Secretions.
T. H. Husband, L.D.S.	Canada	Dental Histology.
F. H. Hudson	England	Dental Æsthetics.
Alphonso Irwin	New Jersey	The Saliva.
R. H. John	Pennsylvania	Operative Dentistry.
Robert M. Kalloch	Massachusetts	The Fifth Pair of Nerves.

Name.	Residence.	Thesis.
Phil. H. Keese	Ohio	Iodine.
Samuel Keiser	Ohio	Indications for Extraction.
William A. Knowles, M.D.	California	Bone.
A. M. Koons	Pennsylvania	Physiology of the Teeth.
S. M. Lempart	Roumania	Salivary Calculus.
H. D. Lynam	Delaware	Mineral Base Teeth.
William P. Mitchell	Pennsylvania	Cancrum Oris.
C. Julius Móczár	Hungary	Continuous Gum Work.
John B. Morrison	Indiana	The Coming Filling.
Harry W. Orr	Pennsylvania	Hygiene.
Felix C. Penton	Cuba	The Mouth and its Functions.
Josef Perl	Hungary	Periodontitis.
Moritz Pfab, M.D.	Austria	Neuralgia.
John A. Sandusky	Tennessee	Histology of the Teeth.
Manuel Suarez	Mexico	Congestion and Treatment of Dental Pulp.
Ludwig Semler	New York	Conservative Treatment of the Pulp.
Lyman W. Sibley	Massachusetts	Odontalgia.
A. C. Spain, Jr.	South Carolina	The Dental Pulp.
W. T. Stooksbery	Ohio	Sulphuric Ether as an Anæsthetic.
Filipp Ungar, M.D., S.D.	Hungary	Digestion.
J. K. Wiley	Massachusetts	Treatment of Devitalized Teeth.
E. V. Wingard	California	Digestion.
Ezra H. White	Maine	Neuralgia.
Thomas H. Whitney, Jr.	New Jersey	Construction of Continuous Gum.

NEW YORK COLLEGE OF DENTISTRY.

The thirteenth annual commencement of the New York College of Dentistry was held at Chickering Hall, Tuesday evening, February 25, 1879.

The address to the graduates was delivered by Rev. Dr. Howard Crosby; the valedictory by Dr. Benjamin F. Luckey.

The number of matriculates for the session was seventy-six.

The degree of D.D.S. was conferred by Dr. William H. Allen, President of the Board of Trustees, on the following graduates. The theses consisted of written answers to questions by the Faculty.

Name.	Residence.
H. W. F. Büttner	Germany.
Sidney W. Bull	New York.
John Carr	New York.
George N. Fischer	New York.
Thomas A. Fletcher	Massachusetts.
Daniel T. Hill	New York.
Rudolph H. Hofhing	New York.
Charles W. Jenkins	Saxony.
Benj. F. Luckey	New Jersey.
C. A. Martinez	Cuba.
Henry G. Marshall	New York.
Charles W. Miller	New York.
Geo. J. Otterbourg	New York.
A. Eugene Raisbeck	New Jersey.
F. Austin Roy	New York.
Alberto F. Ricart	St. Domingo.
Domingo M. Sabater	Cuba.
Eduardo Sabater	Cuba.
T. Milton Smith	New York.
Guillermo Vargas	U. S. Colombia.
Frank R. Wilcox	New York.

BOSTON DENTAL COLLEGE.

The eleventh annual commencement of the Boston Dental College was held at Memorial Hall, Wednesday evening, March 5, 1879.

Essays were read by W. P. Church and F. A. Cooke, of the graduating class.

The valedictory was delivered by A. Ward Spooner, D.D.S., and an address by Professor J. B. Treadwell, M.D.

The number of matriculates for the session was forty-two, with seven of the previous course; in all, forty-nine.

The degree of D.D.S. was conferred on the following graduates by Professor Isaac J. Wetherbee, President:

NAME.	RESIDENCE.	THESIS.
Charles H. Adams	Massachusetts	Conservative Treatment of the Pulp.
Henry A. Baker	Vermont	Æsthetics in Dentistry.
Fred. Wm. Buffington*	Massachusetts	Salivary Calculus.
Wm. Paty Church	Rhode Island	Scrofula.
F. Alstone-Cooke	Massachusetts	Conservative Treatment of the Pulp.
Edward Boynton Davis	New Hampshire	Vulcanite.
George Bradley Elliott	Massachusetts	Duty of the Dentist.
Charles Hamilton, Jr	Massachusetts	Advancement of Dentistry.
John Henry McQuade	Massachusetts	Dentistry.
William Doneson Porter	Rhode Island	Conservative Treatment of the Pulp.
Charles Burton Russell*	New Hampshire	Anæsthetics.
Sherman H. Sanborn*	New Hampshire	Salivary Calculus.
Abram Ward Spooner	Maine	The Oral Cavity.

* Diploma conferred when all conditions are fulfilled.

MISSOURI DENTAL COLLEGE.

The thirteenth annual commencement of the Missouri Dental College was held at the Mercantile Library Hall, St. Louis, on Wednesday evening, March 7, 1879.

The valedictory address was delivered by Prof. E. H. Gregory.

The degree of D.D.S. was conferred on the following members of the graduating class by Professor W. H. Eames, D.D.S.:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
George A. Bronson	Missouri.	Charles J. McBride	Missouri.
Luther A. Buckner	Missouri.	Alfred C. Ries	Missouri.
Charles F. Houston	Missouri.	William T. Stark	Missouri.
Charles L. Hungerford	Missouri.	George A. McMillan	Illinois.

DENTAL DEPARTMENT—UNIVERSITY OF PENNSYLVANIA.

A public commencement of the Medical Department of the University of Pennsylvania was held at the Academy of Music, Philadelphia, Friday, March 14, 1879.

The valedictory address was delivered by John Ashhurst, Jr., A.M., M.D.

The number of matriculates in the department of dentistry for the session was fifty-three.

The degree of D.D.S. was conferred on the following members of the graduating class by Charles J. Stillé, LL.D., Provost:

Name.	Residence.	Thesis.
Aldrich, Henry C	Minnesota	Artificial Dentures.
Brodeur, A. Lactance	Michigan	Caries and Necrosis of Teeth.
Brown, George C	Iowa	Development and Eruption of the Teeth.
Denham, Alexander McG	Scotland	Teeth and their Preservation.
Dow, J. Dorrance	Pennsylvania	Alveolar Abscess.
Garrett, Henry, Jr	Delaware	Dentition.
Graves, Walter La T.	California	Pivoting Teeth.
Hayden, W. Wayland	Massachusetts	Conservative Treatment of the Dental Pulp.
Hroch, Fritz	Saxony	The Diseases of the Antrum.
Johnson, Levi W	New Jersey	Refining of Gold and Silver.
Joy, Charles G	Pennsylvania	Relation of Teeth in the Mouth.
Long, Frank Morton	Pennsylvania	Conservative Treatment of the Dental Pulp.
Masser, William H	Pennsylvania	Leptothrix Buccalis.
Miller, Willoughby D	Ohio	Conservative Treatment of the Dental Pulp.
Moss, Louis DeL	Pennsylvania	Gold.
Nickell, Robert J	Pennsylvania	Mechanical Dentistry.
Nims, Alfred J	Massachusetts	Operative Dentistry.
O'Doherty, William J	Ireland	Conservative Treatment of Pulp.
Ramsden, John	Pennsylvania	Circulation of Blood.
Scofield, Alfred H	Connecticut	The Approximal Cavities.
Timerman, Edwin C	Illinois	Pivot Teeth.
Van Meter, George H	Italy	Materials for Filling, Treatment of the Pulp, Filling Roots.
Walker, Charles C	Pennsylvania	Diseases of the Antrum and their Treatment.
Wetzel, Adolf	Switzerland	Gold and its Use in Operative Dentistry.
Wiggins, Stephen L	Canada	Dental Minutiæ.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

The eleventh annual examination of the Royal College of Dental Surgeons of Ontario, Canada, held in the city of Toronto, was completed on March 7, 1879.

The examinations being entirely written, no thesis is required.

Students in attendance on lectures, twenty-three.

The following gentlemen received license to practice dentistry, and the title of L.D.S. (Licentiate of Dental Surgery), viz.:

Name.	Residence.
W. J. Broadfoot	Port Hope.
Wm. Brace	Smith's Falls.
W. A. Brownlee	Orangeville.
W. E. Cartwright	Stratford.
F. E. Crysler	Niagara.
G. C. Davis	London.
Charles Fitzsimmons	St. Thomas.
Edward Hart	Brockville.
C. B. Hayes	Brockville.
R. A. Harvey	Orillia.
G. E. Hanna	Kemptville.
C. H. Hills	Hamilton.
M. Kinney	Tilsonburg.
W. H. Manning	Peterboro.
T. A. McMurtry	Port Hope.
C. L. Pearson	Berlin.
A. S. Vogler	St. Thomas.

OBITUARY.

PROF. JOHN HUGH McQUILLEN, M.D., D.D.S.

SUDDENLY, on March 3, 1879, DR. JOHN H. McQUILLEN, in the fifty-fourth year of his age.

DR. McQUILLEN was born in Philadelphia, February 12, 1826. He was the son of Captain Hugh McQuillen, who served under Decatur during the war of 1812. The ancestors of his mother, Martha Scattergood, came to America with William Penn. He received his early education in the Friends' schools in Philadelphia, and at the age of sixteen entered as clerk in an importing house with the purpose of devoting himself to commercial pursuits. His tastes, however, inclined him to medicine, and after attaining his majority he commenced its study in the Jefferson Medical College, from which he graduated in 1852. Meantime he was also studying dentistry, and in 1853 he received the honorary degree of D.D.S. at the first commencement of the Philadelphia College of Dental Surgery. In 1857 he was elected to the chair of operative dentistry and dental physiology in the Pennsylvania College of Dental Surgery, holding that position for one year, and relinquishing it to take the chair of general anatomy and physiology, which he resigned in 1862. In 1863, principally through the efforts of Dr. McQuillen, a charter was obtained for the Philadelphia Dental College, of which institution he was made dean and professor of physiology, retaining both positions until his death. In 1859 the publication of the DENTAL COSMOS was commenced, Dr. McQuillen becoming one of its editors, which relation was continued until his retirement in 1871.

Dr. McQuillen has been a frequent contributor to the literature of the profession from his first connection with it, and has held important positions in various dental societies, including the presidency of the American Dental Association, of the Pennsylvania State Dental Society, and of the Odontographic Society of Pennsylvania.

As an operator Dr. McQuillen was recognized as possessing more than average skill, supplemented by an earnestness and conscientiousness which were a guarantee of faithful service.

As a teacher he was enthusiastic and ambitious, laboring to the best of his ability to prepare those whom he instructed for the intelligent and successful practice of their vocation. Hundreds of the alumni of the institutions in which he taught will hear of his decease with sincere sorrow.

Dr. McQuillen was by nature an organizer. To his organizing faculty, as well as to his zeal, energy, and tact, the success of the Philadelphia Dental College is largely due, and it was these qualities which caused him to be recognized as a power in the profession at large. If ever any man was consecrated to the chosen work of his life, John H. McQuillen was. He devoted to the original organization of the American Dental Association, to its development and to the general educational interests of the dental profession, the best efforts of his life. Other men may be found of greater natural gifts, of larger attainments, and of more brilliancy, but none who have contributed more freely, more constantly, more unselfishly to the general good. And though he possessed personal gifts and graces which won the respect and esteem of a large circle of friends, professional and otherwise, who will hold his memory in affectionate remembrance; though he was courteous, genial, and kindly in spirit and manner; though he was hospitable to a fault, it was not to these qualities chiefly that he owed his position and his usefulness in the profession, but to a life devoted to its improvement and elevation. Considering his energy, his industry, his unselfishness, the worthiness of his aims, the work he has done, the influence of his example as an advocate of educational progress and reform in his profession,—an influence which will be felt for good through many years to come,—the sudden termination of his earthly career is a calamity, not alone to his family and personal friends, not alone to the institution of which he was the recognized head, but to the practitioners of dentistry wherever located, and especially to American dentists. His place will be difficult to fill; perhaps not in this generation will it be in all respects completely filled.

The sad side of the history is that he allowed his interest in the school with which he was associated, and the general interests of the profession as an organized body, to make exhausting and damaging drafts upon him, involving the sacrifice of time, money, practice, ease, and pleasure. Had he brought the same ability, the same industry, the same energy, the same concentration, the same persistence to the accumulation of means by the practice of his profession, he might have left his family handsomely provided for. That he did not do so not only constitutes a cause of regret for their sakes, but calls for a substantial recognition of his valuable labors and services in the advancement of the dental profession in usefulness, self-respect, and public regard, and in strengthening fraternal courtesy and co-operation among its members.

Dr. McQuillen leaves a widow and four children, one of whom, Dr. Daniel Neall McQuillen, a graduate of the Philadelphia Dental College, has but recently engaged in practice. Mrs. McQuillen will receive the hearty sympathy of hundreds in the profession who have shared the hospitality of her home, and who will remember with what interest and kindness she received and ministered to her husband's friends.

The resolutions appended show the estimate in which Dr. McQuillen was held in his own city, and by his colleagues and pupils.

At a meeting of the dental profession, held at the Philadelphia Dental College, March 5, called with reference to the decease of Dr. John H. McQuillen, the following preamble and resolutions were adopted by a rising vote:

Whereas, Dr. J. H. McQuillen has been suddenly removed from among us by death, it becomes our privilege as well as our sad duty to make record of the event, and to express our estimate of his worth and our sense of the loss thus sustained; therefore,

Resolved, That Dr. McQuillen has been for many years so identified with the interests of the dental profession, and so earnest in their advancement, so indefatigable in his efforts in behalf of the elevation of the standard of education, of graduation, and of practice, that his death leaves no one man who in all respects fills the place thus made vacant;

That while as an operator he was gifted with more than ordinary ability; while as a teacher he was conscientious and earnest, his labors in the organization of the profession and in promoting its educational interests gave him marked pre-eminence;

That, more ready to serve than to be served, more solicitous for the advancement of the profession with which he was identified than for personal advantage, he, indeed too often, ignored the latter in the effort to promote the former;

That a life devoted to the self-sacrificing service of his profession, and to the promotion of all plans having for their object its improvement, made him an example of concentration, of industry, and of persistent effort worthy of imitation;

That, while thus recording our appreciation of his professional attainments and labors, we desire also to express our affectionate remembrance of him as a genial, generous, sympathetic gentleman, and to tender to his bereaved family the assurance of our profound sympathy.

At a special meeting of the Faculty of the Philadelphia Dental College, held on Wednesday, March 5, 1879, the following preamble and resolutions were offered, and, after appropriate remarks by members of the Faculty, were adopted:

Whereas, The sad intelligence has reached us of the sudden death of Dr. John H. McQuillen, practically the founder of this institution, and its Dean since its establishment, sixteen years ago; and,

Whereas, It is fitting that we should place on record a testimonial of our high appreciation of his ability, industry, untiring zeal, and steadfast consecration to the interests of this school; therefore,

Resolved, That to his organizing faculty, his earnest efforts, and to his unselfish devotion to its interests, the Philadelphia Dental College owes, to an extent not to be estimated, its successful career as an educational institution, and its high reputation both at home and abroad; trials, impediments, opposition—circumstances which operated as discouragements to others—only serving to stimulate him to fresh endeavor;

That in his death the dental profession has lost one who has done as much perhaps as any one man to elevate the standard of dental education and practice in this city, in this country, and to no little extent throughout the world; his consecration to the furtherance of all efforts which in his judgment would advance the interests of the dental profession having so won the confidence of his brethren as to command their recognition of him as an able and trustworthy leader;

That, appreciating his talents, his attainments, his labors, his earnestness and his self-sacrificing spirit in all that concerned the interests of this school, we especially cherish the memory of his numerous manifestations of personal interest and kindly helpfulness;

That, with a copy of this expression of our appreciation, esteem, and affection, we tender to his widow and children our sincere sympathy.

At a meeting of the Alumni Association of the Philadelphia Dental College, held March 5, 1879, the following preamble and resolutions were adopted:

Whereas, We have received the painful intelligence of the decease of our beloved and honored professor, Dr. J. H. McQuillen; therefore,

Resolved, That in his death the Philadelphia Dental College has lost one who was ever ready to devote his time, talents, and best efforts to the promotion of its highest interests;

That the profession has lost an earnest worker in the cause of dental education—one to whose indomitable energy and perseverance the college was indebted for its success, in which every graduate and student feels a legitimate pride;

That a copy of these resolutions be forwarded to his bereaved family, with the expression of our sincere sorrow and sympathy.

At a meeting of the students of the Philadelphia Dental College, Wednesday morning, March 5, 1879, the following resolutions were adopted:

Whereas, Our friend and beloved teacher, Dr. J. H. McQuillen, has been removed from our midst by death; it is hereby

Resolved, That we receive the intelligence of his sudden decease with deep regret and heartfelt sorrow;

That in his death the Philadelphia Dental College loses a most able instructor, the dental profession an arduous and conscientious worker, and society a useful and honored member;

That a copy of these resolutions be sent to the family of the deceased with the assurance of our deep sympathy in their bereavement, also that a copy be furnished the DENTAL COSMOS and the city papers.

ISAAC WOOLWORTH, M.D.

DIED, of paralysis, at New Haven, Conn., February 15, 1879, DR. ISAAC WOOLWORTH, in the sixty-ninth year of his age.

DR. WOOLWORTH was born in Pinckney, N. Y., May 10, 1810; graduated in medicine at Fairfield, N. Y., in 1837; commenced the practice of medicine in Westfield, Mass., in the same year, but on account of ill health was obliged to discontinue general practice after the lapse of a year, and subsequently devoted himself to the practice of dentistry, remaining in Westfield until 1856, and then removing to Meriden, Conn., and from there to New Haven, in 1860, where he remained until the time of his death.

Dr. Woolworth was a generous, kind-hearted, Christian man, and won the esteem and respect of the communities in which he lived. He was one of the pioneer dentists of Massachusetts, and lived to witness many great changes in the theory and practice of dentistry.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

If an amalgam filling be heated it crumbles to pieces. Why will it not become hard a second time if remixed with mercury?—A. B. P.

If J. W. C. applies the apple brandy to the lingual surface of artificial dentures "every fifteen minutes at first," it is easily seen how the patients are speedily relieved of their nausea, and at the same time they may become oblivious to all (hic) care and (hic) trouble. How would he proceed if his patient was a "Murphyite"?—W. D. K.

Two weeks since one of my patients, a young lady, came to me to have several upper incisors filled. A year previous there had been no trace or suspicion of decay in the teeth in question; now there was in each tooth on the labial surface and close to the gum, a large, shallow, and excessively sensitive cavity. She informed me that a month previous to her visit to me her teeth had been neither decayed nor sensitive; but having been ill, her physician had ordered a preparation of iron, which in less than ten days had produced the injury as I saw it.

I attempted excavation, but found it impossible, owing to excessive pain. I then treated the teeth with carbolic acid pure; but owing to the distress it occasioned, I mixed with it a little sulphate of morphia. After three days of treatment, I filled the cavity, excavating as little as possible. A week later I discovered that the left central had turned of a dull pinkish hue. There was no soreness. The questions I have to ask are: Is the pulp dead? If so, what caused it to die? There was no arsenic used. Could it have been the result of the application of the carbolic acid and morphia? How shall I proceed in its further treatment and to restore the color?—C. L. H.

Noises by the Movements of the Condyloid Processes.—For the information of W. H. H. and J. W. C. In many persons the attachments of the processes in the glenoid fossa are extremely loose, so that the joint is the subject of partial dislocation (sub-luxation) that may be involuntary or produced at will, and without pain. The glenoid fossa is formed in the temporal bone, and partly by the petrous (hard) portion, which contains the internal auditory canal. Bone, particularly hard bone, readily conducts vibrations, and the "snap" with which the process slips to place, after each partial displacement, gives a distinct shock to the petrous portion of the temporal, that is easily heard by the individual concerned, and sometimes by others.—E. N.

REPLY TO W. H. W. IN JANUARY NO.—Six months ago a lady called at my office to consult me with reference to the constant nausea experienced while wearing an upper plate of black vulcanite. She had experienced the same trouble previously while wearing a plate of red vulcanite, and had the black vulcanite substituted in the hope of relief. She had been wearing the latter for about one year at the time of her visit to me. I found the articulation of the incisors interfering slightly with the stability of the plate. I remedied this and advised her to wear the plate a few weeks longer. She did so; but the nausea continuing she desired to have a new plate made; but as I had my doubts about the plate being the whole cause of the trouble, I prescribed the following gargle, which had the desired effect, simple as it is:

℞.—Tinct. capsici., ʒj;
Aluminis, ʒj;
Aquæ, ℥viij;
M.—ft. Gargarisma.

Sig.—Use as a gargle from three to six times daily.

After one day's use of the gargle, she had no return of the nausea. She still wears the black vulcanite plate.—J. CALDER.

"M," in DENTAL COSMOS (March), is recommended to treat the tooth with a solution of the chloride of zinc, alternating with carbolic acid prior to introducing a permanent filling. These medicaments may be introduced on pledgets of cotton into the roots and removed every twenty-four hours, the main cavity of decay being sealed with cotton and sandarac. Efforts should be made at each sitting to enlarge the root canals, and to remove all débris of decomposed pulp, which if allowed to remain would induce unpleasant results. After treating in the manner described until all soreness has subsided, fill with oxychloride of zinc, and cap with permanent filling. If after this any soreness should ensue, it will readily yield to the counter-irritating effect of the tinctures of iodine and aconite root—equal parts combined—applied to the gum.—F. F. DREW, D.D.S.

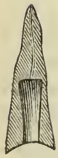
CAPPING EXPOSED PULPS.—Dr. A. C. Robinson, of Louisiana, Missouri, has communicated to me his manner of treating exposed pulps; and his large number of successful cases renders it worthy of report to the readers of the DENTAL COSMOS. He has kept a record of these cases for the last six years. The number treated amounts to over three hundred. He states his percentage of failures at only three per cent., the failures occurring in badly diseased pulps.

His treatment is as follows: Cleanse the cavity of decay; gently syringe it with a warm solution of bicarbonate of soda; cut a cap from tissue paper, both sides of which have been varnished with shellac; smear both sides of the cap with Canada balsam and put it in position; cover the cap and adjoining walls with "Fletcher's Artificial Dentine," mixed thin. If an amalgam filling is to be used it can now be inserted. If gold is to be used, fill with oxychloride of zinc. After the latter hardens sufficiently remove a portion, and introduce the gold.

The tooth should feel perfectly easy after capping; if it does not, the cap should be removed, the pulp soothed, and the process repeated before inserting the permanent filling. Gum shellac is a non-conductor of heat and electricity. Canada balsam is sticky and non-irritant.—H. S. C.

A New Method of Pivoting Teeth.—Having tried nearly all of the various methods suggested for the pivoting of teeth, and not finding any of them to meet all of the requirements,—easy and sure adaptation, firm attachment, non-liability to become loosened by service, etc.,—I at length hit upon the following plan, and, having tested it thoroughly, offer it to the profession for their consideration:

Prepare the root with a stump corundum wheel, and drill it out three-eighths of an inch in depth, of a diameter of about No. 16 standard wire-gauge, enlarging it at the bottom, as shown in Fig. 1. Now fill the canal in the root with gutta-percha or oxychloride of zinc; make a gold tube to fit nicely the aperture in the root, about three-quarters of an inch in length, so that it can be more easily handled subsequently; adapt a plate of gold or platinum to the face of the root; cut a hole in it to correspond to the size of the tube; insert the tube; set the plate over it; adjust it to the face of the root; hold it in position by any suitable cement; remove the tube and plate, and unite them by solder; insert again in the root, and adapt a plain plate tooth, with a gold backing, holding it in position with a little wax or cement. Now remove the tube, plate, and tooth together, and solder the tooth in place as shown in Figs. 2 and 3. Then with a small separating file or saw slit the tube in two or more places for about two-thirds of its length; finish up the back of the tooth, cutting away the superfluous tubing. Now place a thin sheet of gutta-percha on the upper surface of the plate—that which is adapted to the face of the root; warm the tooth and plate over a spirit lamp, and press it up against the root. The gutta-percha will thus hold the artificial crown temporarily in position, and, covering the whole face of the root, make a perfect joint, shown as completed in Fig. 4. With a straight plugger fill the tube with gold or tin foil, condensing it so as to spread the split tube to correspond with the cavity in the root. The tooth is thus dovetailed into the cavity, so that it is almost impossible that it should become loosened, the filling of the tube making it almost equal to a solid gold wire.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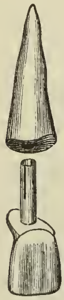
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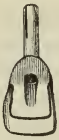
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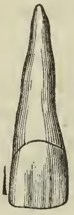
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The advantage of this method consists in the certainty which attends each stage of the operation—no guess work about it, no screws to become loose. The tube so fills the entire cavity of the root that there is no waste motion, allowing it to work loose.—H. K. Leech, D.D.S., *Philadelphia*, *Pa.*

Resection of Inferior Dental Nerve.—The operation of resection of the inferior dental nerve by Dr. J. E. Garretson at the Philadelphia Dental College (reported in the Dental Cosmos for February, 1878), was for the relief of a gentleman who came to me about three years since suffering excruciating paroxysmal pain in the left side of the lower jaw, so severe as to unfit him for business. I extracted several ulcerated roots, but the pain continuing I extracted all the teeth which were decayed, leaving only five teeth in his head and they the inferior front teeth, and these were perfectly sound. As no relief was obtained, recourse was had to hypodermic injections of morphia and atropia, which were followed by all the various medicaments resorted to in such case, but still without relief. I advised the resection of the nerve, and at my suggestion the patient was taken to Professor Garretson. I am glad to state that the operation was a complete success, the patient being free from pain and having regained his usual health.—W. M. Cutler, D.D.S., *Moravia*, *N. Y.*

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ORIGINAL COMMUNICATIONS.

DENTAL PATHOLOGY AND THERAPEUTICS.

BY J. FOSTER FLAGG, D.D.S.,

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[Entered according to Act of Congress, in the year 1873, by J. Foster Flagg, D.D.S., in the office of the Librarian of Congress at Washington.]

(Continued from page 125.)

EVEN to the present time, the idea of "thoroughness" seems to be *one* with *force*, *strength*, *solidity*, and *tightness;* and gentleness, delicacy, softness, and looseness seem just as far removed from "thoroughness" as is possible. If *great force* cannot be used, the idea seems to be that *just as much force* as can be used is the truest approximate to "thoroughness." If a "dressing" cannot be put in *very tightly*, the idea is almost universal that *as tightly as possible* is the nearest approach to correct practice.

It is yet to be learned by the vast majority of our profession that what they have been taught to regard as the highest type of "thorough" dental practice is the *farthest possible from this;* for the beauty, the density, the polish, the elegance *of the work* is the *mark* which forms the point of direction to such extent that, *it is true*, the *one great point*, the *saving of the tooth*, seems to be considered a matter of such certain sequence to such manipulation as to render it *unnecessary to mention!*

Now the *truth* is, that *dental pathology* steps in at this point, and, with constant warning, declaims again and again that "thoroughness" means *tooth saving;* not "*force*," for force may destroy; not "solidity," for solidity may *conduct* to ruin; not "strength," but strength proportioned to demand; not "tightness," but tightness when indicated, and *looseness* when indicated; not "beauty" (though beauty is a desirable attribute largely admissible), but service; not "elegance," but *comfort.*

It is to this end that I desire to impress the urgent need for a *change of base* in this *whole matter.*

It is for the development of these ideas that I have joined so heartily in the movement of the "New Departure."

Recognizing that it meant *radical* subversion of existing theories, I also recognized that it *must* mean *radical* changes in existing practice; and feeling, as I did, the fearfully growing demand for this, and having great faith in the large efficacy for good in its principles and teachings, I have put my hand to the plow with no thought of turning back, but sharing fully the determination of my earnest co-laborers to try and so present our views as that they will command the careful consideration of the members of our profession, and eventuate in showing, by their workings, the *wonderful* capabilities which they possess to the end for which we all profess to work, *the saving of the teeth.*

"Operative" *teaching* of the "electro-*chemical*" theory of the action of filling materials upon tooth-bone is so intimately connected with the "pathological" *teaching* of their action upon the tooth (as an organ) during the various processes for their *introduction*, that a tissue of simultaneous instruction is woven which will necessarily entail *radical* changes in the course of dental education, and which will, therefore, naturally require a number of years for its complete presentation; but it is my belief that each successive year during this *evolution* will show a sufficiently marked *increase* in the *saving of teeth*, and an equally marked *decrease*, 1st, in the *dread of dental infliction* on the part of the community; 2d, in the *great expense* now inseparable from so-called "first-class" operations; 3d, in the *need* for *artificial dentures*; and, 4th, in that opprobrium to dentistry, the *growing resort* to "painless extraction!"

As a *first step* in this direction, then, I would suggest the *habit* of giving to every manipulation during "operating" as a *first thought*, the query, "What will this do *to the tooth?*" rather than, "What will this attain *for the filling?*" and the *habit* of thinking, as a *first thought*, "What would be the *best* material, OR MATERIALS, with which to fill this *tooth?*" rather than, "*How* can I *best* get a perfectly dry, perfectly tight, perfectly solid, elegantly finished, *gold* filling into this tooth?"

I wish to urge this for the thoughtful, reflecting, *growing* members of our profession, especially for the comparatively young members of our ranks; *for*, if they will study the record of the past, and learn the lesson which is taught by the general fear, and almost detestation of our work on the part of patients; by the *hundreds of thousands* of *full artificial dentures* which are worn, even by those of our own country, alone; and by the utter inability to save teeth, *which has* *been proven* on the part even of "American Dentistry," with its admirable *manipulative skill*, it *must* be recognized that a far more reliable foundation for *future reputations* will have to be attained than that of "finger skill in working gold," be it never so highly cultivated.

This change alone will reduce largely the liability to *irritation from dental manipulation*, for it is unquestionably true that not only is periodontitis frequently induced as the direct sequence of protracted application of violence in the introduction of foil fillings, but also, that even if this be not an immediate result, so great "shock" is sustained on the part of both peridentium *and patient*, as to disqualify either from the exercise of that resistive or recuperative effort which, in case of after-trouble, is so essential to the prolonged maintenance of the teeth.

It is thus that "plastic" filling materials come to the rescue from the double consideration of "compatibility with tooth-bone," and "abnegation of mechanical irritation during manipulation," two qualities which alone should entitle them to respectful consideration; but when to these are added those of "ease of *accurate adaptation* from plasticity," "non-conduction," and "possibility of great durability by *judicious combinations*," they then present such claims for *great attention*, *careful study*, and *accurately intelligent manipulation*, that every dentist who desires to rank high in the dentistry of the near future, and thus be best able to relieve those of suffering humanity who require his services, must eagerly recognize them and cordially greet them as boons of almost inestimable value.

(To be continued.)

CELSUS.

Roma. Ob. circ. A.D. 38.

BY E. W. FOSTER, M.D., BOSTON.

(Continued from page 192.)

II.

Celsus Concerning the Teeth.

Translations. Lib. VI., Sect. ix. *Pain of the Teeth.* But in pain of the teeth, which may be truly numbered among the greatest torments, wine is to be wholly cut off. Food also at first must be forbidden, then used moderately, and soft, lest the teeth be irritated by chewing. Then the steam or vapor of hot water is to be applied externally with a sponge, and a cerate of cyprus, or iris plant, spread upon wool, should be placed on, and the head also should be covered. But if the pain be more severe, a clyster may be useful, a hot cataplasm applied over the jaw, and also a hot medicated liquid held in the mouth, and changed frequently. For this purpose the cinquefoil-root is decocted in wine; and the root hyoscyamus is decocted either in vinegar and water, or diluted wine, and a little salt is added to either of them; and poppies not over-dry, and mandrake-root, prepared in the same manner. But in these three, care must be taken lest that which is in the mouth be swallowed. Also the bark of the silver poplar, decocted in mixed wine, is very proper to use; and scrapings of deer horns in vinegar, and wild mint with the fat pitch of pine; likewise a mellow fig in honey-wine, or in vinegar and honey; and when the fig is decocted, the liquid is strained off.

A probe also, wrapped in wool and dipped in hot oil, should warm the tooth itself. Moreover, certain cataplasms, as it were, are put into the tooth itself. For which use, the inner part of the rind of an acid and dry pomegranate is powdered with an equal portion of galls and pine bark, and with these is mixed minium; which being powdered are decocted in rain-water; or panaces, poppy tears, hog's fennel, stavesacre without seeds, triturated in equal portions; or three parts of galbanum and a fourth part of poppy tears. Whatever is applied to the teeth, a cerate such as I have described above ought none the less to be kept upon the jaw and covered with wool. Some also crush and spread on linen, myrrh, cardamoms, each one part; saffron, pellitory, figs, pepper, each four parts; mustard, eight parts; and apply this to the arm of that side where the tooth pains,—if a superior tooth, next to the scapula, if inferior, next to the breast,—and this assuages the pain; and when it is relieved it must be speedily taken away. If indeed the tooth be not badly decayed, we need not be quick in extracting it, unless circumstances compel the necessity of it. But in such a case, to all the fomentations which are mentioned above there must be added certain stronger compositions which relieve pain. Such are those which contain poppy tears, one part; pepper, two parts; sory, ten parts; these are triturated and mixed with galbanum, and this is put around the tooth; or that of Menémachus, chiefly for the lower teeth, in which saffron, one part, cardamom, root of frankincense, figs, pellitory, pepper, elaterium, each one part, alum, poppy tears, stavesacre, crude sulphur, bitumen, bay-tree berries, mustard, of each two parts. But if pain urges its extraction, a pepper corn removed of its covering, and in like manner an ivy berry crowded into the cavity, splits the tooth [dentem findit], so that it extirpates itself by scales.

The sting of the planus fish (which we call pastinaca, the Greeks trygon) is parched, then triturated and mixed with resin, which being put around the tooth loosens it. Scissile alum, also crowded into the cavity, favors it. But it is better to wrap this in a little wool, and then put it in, which thus preserves the tooth, and eases the pain. These prescriptions are accepted by the physicians; but it is known by experience, among the peasantry, that when a tooth pains, the herb horse-mint ought to be pulled up by the roots and put into a basin, and water poured upon it, and put close beside the man entirely covered over with clothes; then red-hot flints are thrown into the basin, so that they are covered by the water, and the man with his mouth open must receive the vapor, close wrapped up, as I have said before. Now both a profuse sweat follows and a continued stream of mucus flows down through the mouth, and secures good health for quite a long time, and frequently for a whole year.

Lib. VI., Sect. xii. *Ulcers of the Tongue.* Also ulcers of the tongue require no other medicine than those which are laid down in the first part of the last chapter [on ulcers of the mouth]. But such as come on the side of it are of the longest duration, and it is necessary to observe whether some tooth opposite may not be too sharp, which often prevents an ulcer in that place from healing, *and for this reason it must be filed* [ideòque limandus est].

Lib. VI., Sect. xiii. *Parulides and Ulcers in the Gum.* Some painful tubercles also grow occasionally in the gums near the teeth; the Greeks call them parulides. At first it is important to rub these gently with powdered salt, or a mixture of calcined fossil salt, and cypress, and catmint; then to bathe the mouth with the cream of lentils, and meanwhile to hold the mouth open till the phlegm is satisfactorily discharged. Yet in greater inflammation, the same medicines should be used that were before directed for ulcers of the mouth; and a little soft lint should be rolled up in some one of the compositions which I said were called antheræ, and this must be put between the tooth and the gum. But if the tumor is too hard and hinders it, the steam of hot water must be applied externally with a sponge, and cerate put on. If suppuration shows itself, this vapor must be used longer, and a hot mulse in which figs are decocted be held in the mouth. The tubercle must be cut, lest by remaining longer it injures the bone. If, therefore, the tumor is large, it should be entirely cut out, so that the tooth may be free on either side.

* * * * * * * * *

It also happens that from an ulcer in the gum, whether a parulis or not, the pus flows longer when a tooth is either rotten or broken, or the bone is otherwise vitiated, and it issues itself by a fistula [*i.e.*, alveolar abscess]; when this is apparent, the place must be opened, the tooth extracted, and the scales of bone, if any, must be removed; if any part is necrosed, it must be scraped. After which the cure is effected as in other ulcers. But if, indeed, the gums recede from the teeth, the same antheræ are useful. It is also useful to chew pears and apples not very ripe, and to keep their juices in the mouth. And weak vinegar held in the mouth may produce the same effect.

Lib. VI., Sect. xv. *Gangrene of the Gums.* . . . If there is pain in the gums, and some of the teeth are loose, it is important they be removed, for they obstruct the cure very much indeed. If medicines are not efficient, the ulcers must be cauterized, which, however, is not necessary in the lips, because it is more convenient to excise them. And it is the same whether cauterized or cut out, they are wholly unable to fill up with that cure which a manual operation can give. Verily, the bones of the gums, which have little life in them, when stripped by burning are bare forever, for the flesh never grows there afterwards. However, lentils must be applied to the burnt places till these have recovered their health as far as it is possible.

Lib. VII., Sect. v. *Extracting Weapons out of the Body.*

* * * * * * * * *

But there is indeed another difficulty attending every wound, when the weapon is either lodged in the bone, or buries itself between two bones in an articulation. If in a bone, the weapon must be moved here and there, until the part which bites the point relaxes; and then the weapon must be extracted either with the hand or forceps, *which is also the method of extracting the teeth.*

Lib. VII., Sect. xii. *Of the Teeth.* In the mouth also are some things which are cured by the hand. Here in the first place the teeth are occasionally loosened either by reason of weak roots, or from the gums decaying. It is proper in either case to apply a hot iron to the gums, so that they may be touched gently, and not burnt deeply. When cauterized, the gums must be spread over with honey, and bathed with mulse. When the ulcers begin to be clean, some dry astringent medicine should be sprinkled upon them. But then, indeed, if the tooth gives pain, and it appears best to extract it when medicines bring no relief, it ought to be scraped around the root, that the gum may be loosened from it; then it must be shaken, and the same continued till it moves easily, for the extraction of a solid tooth is attended with the greatest danger, and not unfrequently the jaw is dislocated. And further, it is attended with more danger in the superior teeth, which are able to give shocks to the temples and eyes.

Afterwards, if possible, the tooth should be taken out by the hand; if not, then by the forceps. Yet if it is decayed, the cavity in the first place must be filled either with lint, *or lead well packed, lest it break under the forceps.* The forceps must be drawn out very straight, lest the frail bone to which the tooth adheres be fractured somewhere by its crooked roots. Neither is this thing without peril, especially in short teeth, which not unfrequently have longer roots; for often when the forceps is not able to lay hold of the tooth, it seizes the bone of the gum and breaks it. But instantly when a large amount of blood flows, one may know that somewhat of the bone is broken. Therefore, the scale which has come off must be sought after with the probe, and drawn out with a vulsella.* If it does not follow, the gum must be cut until the scale loosened from the bone may be removed. But if it be not wholly broken, so that the external jaw swells, and it is not possible to open the mouth, a hot cataplasm of meal and figs should be applied to the outside, until it brings the pus there; then the gums must be incised. The fractured bone is noticed where the pus flows most, so that even now it is proper to extract it. So also when the jaw has injured itself, where it makes a fistula, there it should be scraped. But a rough tooth, where the part is black, should be scraped, and rubbed with the powder of rose leaves, into which a fourth part of galls and another of myrrh may be thrown, and pure wine must be frequently held in the mouth. And in this case, the head should be covered, the patient walk much, with friction to the head, and use no acid food.

But if from a blow or some other cause some of the teeth are loosened, they must be tied with gold to those that are strong, and astringents should be held in the mouth, such as wine, in which a decoction of pomegranate bark, or hot galls, has been thrown in. Whereas, if a tooth should grow in children before the former has fallen out, that which ought to shed should be scraped around, and pulled out; but that which is growing in the place of the former should be urged to place daily with the finger, until it comes to its proper position. Whenever a tooth is extracted, and the root remains, this also should be immediately removed by a forceps made for that purpose, which the Greeks call rizagra.†

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* Probably forceps having teeth.

† Rizagra (*’Ριζαγρα*), *an instrument that pulls out the root.* Both Scultetus and Fabricius describe this instrument as having blades like a crow's beak. It was identical in principle and adaptation to those in use to-day for the same purpose.

Lib. VIII., Sect. i. *Description of the Jaws and Teeth.* . . . The maxilla [see note] is a very movable bone, and is one only; of which, however, the middle and lower part comprise the chin, and from which, on either side, proceeds to the temples; and this alone moves, for the malæ, with the whole bone [upper jaw] which contains the upper teeth, are immovable, but the extreme parts of the maxilla are in two horns, as it were. The other process is wider below, and narrows itself at the vertex, and proceeding forward enters under the *os jugale*, and over that, is bound down by the temporal muscles. The other is shorter and rounder, and acts like a hinge in that cavity which is next to the foramina of the ear; and there inclining itself hither and thither, gives to the maxilla the faculty of moving. The teeth are harder than bone; part of them are fixed in the maxilla, and part in the superior malar bone.* The first four which are cut, are by the Greeks called tomici. The four canine teeth stand on either side, above and below; beyond which are usually the five maxillary teeth, except in those persons in whom the very last [*i.e.*, wisdom-teeth]—which are generally late growing—have not come out.

Those in front are attached by a single root, the maxillaries by two at least, and sometimes also by three or four. And frequently a short tooth gives out a longer root; and the root of a straight tooth is straight, and of a curved one, bent. From the root in children a new tooth springs in a like manner, which very often crowds out the former; sometimes, however, it shows itself either above or below it.

Lib. VIII., Sect. vii. *Fracture of the Maxilla.* . . . First, therefore, the bones are to be forced into place by two fingers pressing on either side, from within the mouth, and upon the chin; then, if the fracture of jaw is transverse,—in which case a tooth generally stands above the next tooth,—when it is brought together unto itself, the two neighboring teeth, or, if they are loose, those next to them, must be bound together with a horse-hair. For different fractures this is needless. The other treatment is the same mentioned before in fractures; for a double linen cloth dipped in wine and oil must be applied, and with that, in a similar way, fine flour and soot of frankincense; then a bundle or soft strap, with a long cut in the middle, that it may take in the chin on both sides; and finally, the ends of it are brought above the head and tied there.

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*Celsus everywhere uses the word *maxilla* for the lower jaw, while the upper he always includes with malar bones.

Lib. VIII., Sect. xii. *Luxated Maxilla.* A luxated maxilla is pushed forward, but sometimes on one side and sometimes on both. If on one side, it inclines with the chin to the opposite side, and the teeth do not articulate properly, but the canines are above the cutting teeth. If on both sides, the whole chin protrudes to the external part, and the inferior teeth are out farther than the superior, and the muscles of the temples appear tense. First, the man as soon as possible must be placed in a seat in such a way that an assistant may hold his head from behind; or he may be seated near a wall, placing a hard leather cushion between the wall and his head, and then let his head be pressed by the assistant, in order that it may be immovable. Then the thumbs of the physician, being wrapped up with linen cloths or rollers lest they should slip, are thrust into the mouth, and the fingers placed about externally. When the maxilla is firmly seized, if it fall to one side, the chin must be shook, and forced towards the throat, then at the same time the head must be held, the chin raised, the maxilla pushed into its seat, and the mouth shut; and all this should be done almost in the same instant. But if the luxation is on both sides, the same method must be used, but the maxilla must be forced back equally. When the bone is replaced, with pain in the eyes and neck, blood must be let out from the arm. And as liquid food is best for all persons at first whose bones are dislocated, so especially in this case, where even frequent speaking by motion of the mouth hurts the nerves of the temples.

Lib. II., Sect. i. *Of Diseases Peculiar to Different Seasons.* . . . The winter is more hurtful to old people, the summer to youths. For the weaknesses that arise at different times: first of all, infants and young children will be troubled with spreading ulcers in the mouth, which the Greeks call *aphthæ*, vomitings, wakefulness, humor in the ears, and inflammations about the umbilicus. Common also to *such as are teething* are abscesses of the gums, convulsions, slight fevers, purgings, and these chiefly about the time of cutting the canine teeth; they have these dangers the worst who are of the fullest habit and are the most constipated. . . . Generally all children are in most danger first about the fortieth day, then the seventh month, then the seventh year, and after these, at the time of puberty. . . . Besides these, the slender are distressed with consumptions, purgings, catarrhs, and pains in the bowels and sides. The corpulent as a rule are oppressed with acute diseases and difficulty of breathing, and often die suddenly, which seldom happens in a more slender body.

(To be continued.)

MANAGEMENT OF PROXIMATE SURFACES OF BICUSPIDS AND MOLARS.

BY SAFFORD G. PERRY, D.D.S., NEW YORK.

(Read before the New York State Dental Society, May, 1877.)

It is with no little hesitation that I attempt the consideration of a subject so important as the management of the proximate surfaces of the teeth. I am impressed with the belief that we perform no operations that call for such conscientious effort, such sound judgment, such ripe experience.

A great part of our daily labor is devoted to the care of these surfaces. Reference to one of my chart-books shows that from a total of 6187 fillings, 607 were upon the buccal, labial, and lingual surfaces, 2990 upon the grinding, and 2590 upon the proximate surfaces. As the largest number of difficult operations were upon these surfaces, it is probable that half my time has been given to their care.

With reference to the treatment of buccal, lingual, or grinding surfaces, there can exist but little difference of opinion. Methods may differ, but results must practically be the same.

Regarding the treatment of proximate surfaces there exists the widest difference of opinion. One operator of large experience and recognized ability emphatically declares that the teeth should be permanently separated. Another of equal experience and ability as earnestly insists that they should be restored. Who shall decide when doctors disagree?

Is it possible to gather from the different modes of practice any conclusions which, combined, may serve as a general guide in the management of these surfaces, and which may enable one to perform the operations required on them in a more permanent manner than has been generally done heretofore? I believe it is. I consider that there are scientific principles that should guide one in these operations, as in all others, and I think the time has come when these principles should be more generally recognized. I shall endeavor to make them clear by carefully considering the two opposing systems.

First, then, with reference to the permanent separations. A man need have but little experience to know that a tooth that stands alone seldom decays. He must also learn that operations on the proximate surfaces are greatly simplified by freely cutting the teeth away. Selfish interests conspiring with his common sense would naturally lead him, then, to adopt the system of permanent separations as a general rule of practice. His experience might be fairly taken as the average experience, so that the system of permanent separations might be expected to prevail during the early period of our profession.

I suppose the radical as well as conservative advocates of separations will agree in considering the ideal space to be that made by the extraction of a tooth. Such a space insures a hard, cartilaginous, healthy gum, the complete exposure of the surfaces of the adjoining teeth, as well as absolute safety from lodgment of food.

If this ideal space, even in reduced size, could be maintained between the teeth there would be but little danger of decay upon the proximate surfaces. But as such a condition would necessitate the extraction of every alternate tooth, it cannot be said that ideal separations will ever become practicable. The nearest approach to them are the spaces that may be made between teeth of broad occluding surfaces and narrow necks,—a slice being taken off each proximate surface, and the separation carried freely through the gum. If the jaw has attained its full size, the wisdom-teeth are fully erupted, and the occlusion of the opposing teeth favorable, such spaces may permanently remain as we leave them. If the cavities on the proximate surfaces are so small as not to reach below the margin of the gum, and the space so made that food will not lodge, the gum will remain attached to the necks of the teeth, and continue in a state of perfect health.

This, I suppose, will be accepted as the most perfect separation that can be practicably obtained without the extraction of a tooth. If not the most perfect in all respects, it certainly insures the greatest safety to the proximate surfaces of the teeth.

If the cavities on the proximate surfaces are so large as to extend under the gum, the fillings must be most carefully finished along the cervical wall, else there will be at this point a chronic state of inflammation of the gum, which will unsuit it to bear the impact of food, and will favor the recurrence of decay. Even if the fillings are most carefully finished, there may still exist a slight departure from health on the part of the gum, though not sufficient to cause discomfort or do appreciable harm.

The conditions requisite for this most perfect separation—the teeth with broad crowns and narrow necks, the adult jaw, and the favorable and permanent occlusion—are not very generally met with.

I suppose it will be conceded that the next most favorable space is that which may be made between short teeth of large necks, and which stand close together at the gum.

Between such teeth a parallel space of equal width on the buccal and lingual side may be cut down to near the margin of the gum, and gracefully curved in the form of an arch. This leaves a shoulder on each tooth terminating at the gum, which serves to keep the teeth in their normal position, and to protect the gum. The space should then be somewhat widened on the lingual side, and so shaped as to be self-cleansing. To get the full benefit of such a space the shoulder must not on any account be carried below the gum, nor must there be the slightest space between any two teeth at this point. The teeth must stand so tight that even the slight lateral motion in mastication will not permit sufficient spreading to allow stringy particles of food to force through against the gum.

The space must be a liberal one, else there will not be a constant change of the particles of food and mucus that settle in it, and which, if allowed to remain, would ferment and cause decay.

It must not be carried under the gum the slightest, for if it did not cause irritation of that tissue at that point, it might cause irritation by exposing the festoons of the gums on the lingual and buccal side. On the other hand, if the space is not carried up just to the gum, but the teeth are allowed to remain in contact some little way down from the gum, a recurrence of decay may be looked for just above the exposed shoulder and near the gum. Such a result would be disastrous in the extreme, as the success of such a separation as this depends upon the solidity of the structure of the tooth just at the gum. Once let disintegration of this shoulder commence and there can be no security until it is restored with gold. If this be done judiciously the teeth may be considered comparatively safe.

It cannot be denied that there are strong reasons in favor of such separations as these, though the number of teeth between which they may be made is also not very great.

The advantages consist in the simplification of the fillings required, the readiness with which the surfaces may be examined, and the ease with which fillings may be replaced when required.

Such spaces may also be easily kept free and clean by careful patients. Their shapes are such that they will be kept reasonably clean even in the mouths of careless patients. It is between this class of teeth and in this way that separations in anticipation of decay can best be made, and at an earlier age, owing to the slight danger of change of position.

On the other hand there are some serious objections to these spaces as well as those first described.

One of the greatest is the loss of so much of the masticating surface of the teeth. With our ideal space, it amounts to the loss of a whole tooth. With the other spaces, no inconsiderable portion of each adjoining tooth must be cut away.

Aside from the sensitiveness that often follows this cutting, I think it will not be denied that there is increased danger of decay from exposure of the dentine. This is particularly true of the teeth that stand in contact at the gum, especially if they are of poorly calcified structure. If decay often occurs on the exposed buccal surface, so it may oftener be expected to take place on these cut surfaces, just at the curve which forms the shoulder, or at the exact point of contact. And if such a space is made before the wisdom-teeth are erupted and the jaw in a permanent state, there is also the danger of the crowns tipping together at the grinding ends, the shoulder at the gum acting as a pivotal point.

With the free space first mentioned there is also the loss of lateral support, which, in the mastication of hard substances, is a matter of no small account. It should be remembered that teeth, like soldiers in line, need the support of their fellows when the hard work of the battle commences. This is doubly true when the teeth are not firm in their sockets, through disease of the gums or absorption of the alveoli.

If, then, to offset the advantages, we have found serious objections to this system of separation, even when applied to the teeth best suited to it, what may we expect from the large number that are not suited to such treatment? As, for instance, a large proportion of the narrow-necked teeth first described, which cannot with safety be separated owing to the fact that the wisdom-teeth are not yet erupted, or the occlusion not such as to prevent the cut teeth from closing up.

The eruption of the wisdom-teeth may crowd the teeth forward, or the loss of a tooth on the opposite jaw may so change the force brought to bear by the occluding tooth or teeth, that the space which was at first self-cleansing and secure may close up and become a source of annoyance and of danger.

In the description I gave of the first and, as it seemed to me, most favorable class of separations, I assumed that the teeth would not change position. Could I be certain that in five or ten years there would not be a decided change of position of even these teeth? Who can so accurately estimate the forces continually operating in the mouth as to assume that at a given time a certain tooth will occupy a given position?

It must be remembered that motion is always in the direction of least resistance, and if the teeth are cut, and motion allowed, it will be difficult to tell the position they may occupy a few years hence. How few, alas, ever stop to think that they may change position at all! It seems, then, that our favorite space cannot be made with safety until adult life.

But what is to be done before that time, which is the period of most rapid decay? Knowing the danger that arises from contact of the teeth, shall we separate, and if they close separate again, and so on *ad infinitum?* Let those martyrs who have experienced this treatment answer.

There still exists a large number of teeth which have neither narrow nor broad necks, and between which separations of any kind cannot be made without risk. Their necks are slightly narrower than their crowns, and yet not sufficiently narrow to allow self-cleansing spaces when they are cut down to the gum, as before described. Nor do they stand near enough at their necks to allow the shoulder to be made just at the gum.

If a shoulder is left to hold the tooth in place, and protect the gum, its position must be determined by the taper of the teeth from the grinding surface towards the gum. If the teeth taper much, it will necessarily be nearer the grinding surface; if but little, it will be nearer the gum. If the point of contact must be near the grinding surface, the danger of decay is but slightly lessened by cutting the teeth,—for still all that surface above the point of contact is in danger,—since it is well known that decay generally commences just above the point of absolute contact. If the teeth do not taper much, and the point of contact can be carried near the gum, but not to it, then we are no better off, for that diminished surface between the point of contact and the gum is still in danger.

It is even more certain to decay, because the cut forms such a deep and acute V that mucus and minute particles of food are sure to lodge at the bottom of the space and ferment there.

An examination of teeth that have been cut in this way will show that these spaces are inviting pockets in which food and mucus find a secure resting-place.

Cutting down too near the gum only transfers the point of contact farther from the grinding surface, and to a point more inaccessible and more difficult to fill if decay recurs.

If a double V-shaped space be made, opening on the lingual side, and extending to the gum, and reaching a quarter, a third, or half the way to the gum on the buccal side, still the same danger of decay exists near the gum towards that side. Such a space also forms a dangerous pocket, besides exposing the gum on the lingual side. There is also the danger of final rotation of the teeth in their sockets and partial closing of the space. There will be the same dangerous pocket if the space be made upon the buccal side, or if made partly upon the buccal and partly on the lingual side. If made upon the buccal side, there will be danger near the gum on the lingual side. If made equally on the buccal and lingual sides, the triangular surface between the cuts and above the point of contact is still in danger.

So certain are these spaces to catch and retain food and mucus, and so certain is decay to recur near the point where they do touch, that it is wise that the advocates of this system urge that the teeth be occasionally pressed apart and the surfaces polished.

If the separation is carried through to the gum with no attempt at leaving a point of contact, even a worse condition may be expected. In this space, which between this class of teeth cannot be made wide enough to be self-cleansing, food lodges, is forced against the gum, and remaining undergoes a fermentation, and encourages decay of the most rapid kind, besides inviting it to the most inaccessible part of the tooth.

Some of the advocates of this system prefer this kind of space, claiming that the discomfort of food pressing against the gum insures its removal. I think, however, that it is not true that pain is always felt, for the gum after a time loses its sensibility, and fails to report the presence of a foreign substance. This very absence of discomfort may encourage a false security, the minute particles of food and mucus being allowed to remain to hasten their fatal work.

The crowding of food between the teeth, I am forced to believe, is one of the worst consequences that may be expected to follow this aimless tampering with the shapes of the teeth.

Patients may assert that they have no trouble of this kind, yet a careful examination of the spaces will show an inflamed and spongy condition of the gum, which is sufficient evidence that an unnatural condition exists at this point. Generally there is great annoyance, and I have often seen spaces between teeth of this class that were enough to test the patience and Christian fortitude of the elect. If we have found so many serious objections to the plan of permanent separations, and have reason to feel disappointed with the general application of a system from which so much good has been promised, and from which so much evil has arisen, may we hope for more encouragement in considering the opposite method, which consists in the restoration of the shapes of the teeth? I think we may.

I am convinced that the system of restoration as it can now be practiced, while avoiding the dangers, includes nearly all of the advantages of the system of separations. It also possesses some other very important advantages.

As to the danger of allowing the teeth to stand in contact, I am willing to grant all that may be claimed by the most uncompromising advocate of separations. But I know of no way of accomplishing this separation so securely as by cutting the teeth away enough for this purpose in preparing the cavities, and then restoring their shapes with gold.

It has been generally considered that the permanent separation of the teeth is accomplished only by cutting them apart. It has either not been observed, or it has been forgotten that the teeth can be, and with larger proximate fillings necessarily are, permanently and securely separated by the perfect restoration of contour.

Occasionally there comes under our observation a perfect, or nearly perfect set of teeth. The teeth stand firmly together, the gums are safe, and the occlusion perfect. Such a natural condition exists that the patient is not even conscious of having teeth. We are struck with admiration as we linger over this example of nature's perfect work.

In a large number of the mouths that come under our care we can have practically the same condition. Large fillings may be required, but if they are properly shaped the same healthy gum and perfect occlusion may be secured. If the teeth have been sadly mutilated and displaced before coming into our hands, our task may be a trying one. In many cases it may be so difficult that, considered in all its relations, it will be unwise to attempt it. If we are not very perfect operators, it may not be wise to attempt it at all. But if we have entire charge of the patient from the time of the eruption of the teeth, this very desirable condition may be secured far more easily.

Let us then consider how it may be accomplished, as well as how we may secure more lasting operations on the proximate surfaces, as was promised in the beginning of this paper.

Let us take an imaginary case. Two small cavities appear on the proximate surfaces between the bicuspids. We will suppose the operator to be opposed to permanent separations; therefore, the teeth are wedged apart to give room to insert the fillings. After the operation they settle back in contact as before.

Two or three years go by, when an examination reveals a recurrence of decay about the margins of the fillings. Again the teeth are wedged apart, the fillings removed, the cavities somewhat enlarged and refilled as before. A few more years elapse, when again a recurrence of decay is discovered. Once more the teeth are wedged, though not so far this time, for now the cavities are so large that it is evident that it will be necessary to cut down from the grinding surface, as well as to cut away all the softened tooth-structure that was in contact. The cavities are filled, the shapes of the teeth restored, and this time many years go by, and still there is no sign of a recurrence of decay.

How shall we account for the failures, as well as for the final success?

The first and second time the fillings were so inserted that the teeth still remained in contact, and having failed to change the conditions which first induced decay, we might have expected its recurrence in due time. The last time they were so large that their margins were exposed, except at the cervical wall, and the teeth could not rest in contact.

Let us take a hint from this. In the first place, if these cavities had been sufficiently enlarged to allow the margins of the fillings to become just free on the buccal and lingual side, and along the grinding surface border, and the gold had been rounded out instead of being filed flat, the teeth would have been comparatively safe.

Here let me say that to expose the edges of the fillings the cavities need not be so very much enlarged, if the gold is well rounded out. In some few cases, where it is desirable to keep the gold out of sight, the contour may be even slightly exaggerated, as in that way the margins of the fillings will be free and safe, without extending so far out towards the buccal surface.

If the small cavities are enlarged in this way there is also greater certainty of securing perfect enamel margins, for the influence of decay on proximate surfaces often spreads farther from the cavity proper than may seem at first sight.

I think it may be accepted as a safe rule that the smaller the fillings on proximate surfaces the greater the danger of early failure, and the larger they are the less danger of a recurrence of decay.

A pin-head filling, placed on the proximate surface of one of my bicuspids by Dr. Varney, failed in two years. Large contour fillings on the proximate surfaces of the molars, and of one bicuspid, made by him at the same time, have now stood eight or nine years with no sign of failure. I know of no fillings that can be, in the very nature of the case, more secure than those very large ones that extend up under the gum, and well out upon the lingual and buccal surfaces of the teeth. The cervical margin is covered and protected by the gum, and the lingual and buccal borders are so exposed to the friction of food and the washing action of fluids as to be kept clean almost without the use of the brush.

If this reasoning is correct, it follows that the more frail the teeth the larger the fillings should be made, and, on the other hand, the better their structure the less danger in leaving the fillings small.

It is generally said that some teeth are so frail that they must be permanently separated. It is my firm conviction that such teeth are the ones that need restoration most; even restoration may not save them, but it will preserve them longer than any other method with which I am familiar.

It is so easy, however, to be misunderstood, that I must here say, that even if the perfect restoration of very frail teeth be absolutely the best method, yet I am not willing to advocate its too general adoption.

In the hands of a few accomplished operators, and for those patients who are able to seek the best service, and are willing to expect final failures, such operations, in my judgment, are the best that modern dentistry has to give. But in the hands of most operators, and for most patients, I think that perhaps better results with such teeth may be expected from permanent separations, even though they be attended by many of the evils I have described. If restorations with gold cannot be well performed they had better not be attempted at all. In such cases perhaps restorations with amalgam may have advantages sufficient to overcome its defects as a filling material.

In most cases I should prepare my cavities in accordance with the following general rules. Teeth of good structure, in a healthy mouth, having small cavities, may be filled without cutting till the margins are free. Teeth of medium quality should be cut till the margins of the cavity are just free on the buccal and lingual sides, and if not cut through from the grinding surfaces, should yet be cut so as to allow the gold to come in sight along the proximo-grinding surface borders, after the teeth have closed. Then the only danger exists at the cervical margin. In very frail teeth even small cavities may not be safe until cut up to, and sometimes even under, the gum.

During the development of the teeth the anterior surfaces of the first molars, when decayed, should be filled in accordance with these general rules. This should be done after the loss of the temporary molars, and before the bicuspids are developed and in the way. Such operations are generally not easily performed, owing to the age of the patient, but it may often be best to insist upon them while the surfaces of the teeth are so exposed. In the nature of the case there can never again be so favorable a time for facing these surfaces with gold, making them thereby safe against their eventual neighbors, the bicuspids. By the time the proximate surfaces between the bicuspids and between the molars need attention, the patient will be old enough, and the mouth sufficiently enlarged, to render the performance of such operations comparatively easy.

By following this general plan up to the time of adult life the teeth will be kept in position, and a perfect development of the jaws insured. The gums will be secure and comfortable, and the teeth as useful as in the perfect denture before described.

It still remains for me to notice a method of filling large cavities in teeth that stand close together at the gum. It is applicable more particularly to teeth that are badly decayed and broken down, but which yet contain living pulps.

In such teeth it is often difficult to obtain sufficient anchorage for contour fillings, and sometimes even such fillings would not be advisable if they could be made. I go, then, to the other extreme, and leave a permanent separation at the grinding surface. I first wedge the teeth a little way apart, and cut the cavity up even with the edge of the gum, or a little under it if necessary. I cut away the frail parts of the tooth, and round over the sharp angles at the grinding surface. I then so shape the fillings that they shall stand firmly in contact at or near the gum when the teeth have closed, so that nothing can pass through against the gum. I extend the fillings out to, and sometimes over the edges of the enamel, and so shape them as to protect the festoons of the gum on the lingual and buccal sides. After shaping them so as to give a firm point of contact near the gum, I slant them off quickly to the grinding surface, sometimes giving them the graceful curve before described. Such fillings keep the teeth in position, protect the cut surfaces, and shield the gum. They also present an inclined plane off which the food slides, so that they escape the strain of mastication.

Of course there is a loss of masticating surface, but there is a compensating gain in security. In fact, it is doubtful if any fillings on the proximate surfaces can be more secure than those put in in this manner. Smaller cavities can also often be treated to advantage in the same manner. Such operations are certainly more easily performed than those of full contour. Unfortunately, they can be made only on the surfaces of teeth that stand in contact at the gum.

With teeth that stand a little apart at the gum, I make a compromise between these fillings and those of full contour, building the point of contact towards the grinding surface, in proportion as they stand apart at the gum.

Whenever full contour fillings are made, they should be so shaped as to touch firmly at the grinding surface. No compromise whatever can be allowed here. If even a slight space is left between them at this point, food will force through and lodge against the gum, and cause all the annoyance that can be expected from the worst kind of permanent separations. In view of this I think it unnecessary, and sometimes even unwise, to fully restore teeth that, from the loss of a neighbor or a change in the occlusion, must eventually move slightly apart. I think it better to anticipate such inevitable change of position, and make at once a free self-cleansing space down to the gum. Such an open space is less annoying than one wide at the gum but narrow at the grinding ends of the teeth.

I am led to think that some operators, who claim to have had unfavorable results with contour fillings, have not prepared their cavities so as to get free margins, and have not always taken nature as a guide and carried their fillings out round and full, and so shaped as to touch firmly at the grinding surface, or at any point between it and the gum. To a certain extent it is unfair to admit the testimony of such operators against contour fillings.

The system of restoration is one that must be practiced thoroughly, if it is attempted at all.

I suppose it is unnecessary to speak in condemnation of proximate fillings filed flat, with no attempt at securing a self-cleansing space, or a perfect contour. Such aimless operations show either carelessness or inability on the part of the operator. They are worthy to be classed among the early efforts of the dental profession.

It may be thought that I take strong ground in favor of contour fillings. As a general rule of practice to be applied in most cases, I certainly do. I am forced to this position by my own observation and experience.

Let me hastily sketch that experience, though it compels the use of the personal pronoun oftener than I wish, and betrays me into the expression of motives and feelings when I ought to be giving you scientific reasons for the conclusions I have reached. My earliest method of managing these surfaces was to cut until I reached sound structure, and then to fill even with the edge of the cavity, giving little thought to the shape of the teeth, the safety of the gum, or the danger of future decay. This was before the rubber dam. Later, under the influence of the late lamented Dr. Varney, and from observation of Dr. Atkinson's method, I became convinced of the advantages of accepting nature as a guide, and for several years, in most cases, I made strictly contour fillings.

In 1870, in a paper read before the Odontographic Society of Pennsylvania, and published in the November Dental Cosmos of that year, I am on record in favor of such operations. Several years' experience developed no objections to them, except that they were difficult to perform, were expensive, and confined attention to a limited number of patients.

After the publication of Dr. Arthur's book, I began to question if I had not been doing unnecessary work. A careful study of this system, with such observation of its practical effects as I could obtain, led me to think favorably of it. A growing practice forced me to be ready to accept any method that fairly promised the greatest good to the greatest number. Therefore I "first endured, then embraced." I commenced timidly, but grew bolder as I became more accustomed to cutting the teeth. Finally, I became so demoralized as to willingly destroy the shapes of teeth that I had before guarded with jealous care. I made all the different kinds of separations described in this paper. I made them very carefully, and always endeavored to avoid annoyance to the gum, and whenever I could to prevent change of position of the teeth. My general rule was to reduce the surfaces in contact to a point of minimum size.

The result of that practice, extending over a period of four or five years, has not fulfilled its promise. It has proven instead a source of discouragement and mortification. Failures which formerly occurred only in reasonable numbers, have, under this system, been surprisingly frequent. The average of operations performed seven and eight years ago is to-day standing more securely than the average of those performed three and four years ago. Irritation of the gum and change of position of the teeth which could not occur before, have frequently followed this practice, even though I have taken the greatest care in making the spaces.

There has been left me, therefore, no alternative but to return to the restoration of the shapes of the teeth as a general rule of practice. Considerations of pecuniary interest would lead me not to do this. The hope of health and long life are certainly not strengthened by it. But it has come to be so much a matter of conscience that I have no choice. I can no longer adhere to the practice of permanent separations and feel that I have rendered my patients the service they have a right to expect. Nor can I longer bear the demoralizing influence which this practice encourages and begets.

During the last year I have been restoring the shapes of the teeth, and the feeling I have had suggests the return of the prodigal son. If I have any satisfaction in reviewing the labor and experience of the last five years, it is that I have learned between what teeth and under what circumstances permanent separations may be safely and advantageously made.

In reply to the general statement that restorations necessitate hard work, I can only say there can be no excellence without labor. In the very nature of things, there can be no royal road to permanent success of any kind. But I think it will weary one but little more to devote six hours each day to a few operations which are performed well, than to give six hours to a larger number which cannot be performed so well. Moreover, appliances have been so improved that even difficult operations are rendered comparatively easy. With the electro-magnetic mallet large contour fillings are no longer so much the dread of patient and operator.

Those who are not using this instrument are losing the service of a willing friend.

As a further slight aid to the restoration of contour I have devised an appliance, by means of which the molars and bicuspids may be screwed apart and firmly held while the fillings are being inserted and finished. I have also devised a set of metal wedges by which, in large cavities, the rubber dam may be carried above the cervical wall and held without disturbing the festoons of the gums, as must be the case with wedges of wood or the ligature. I have also a pair of calipers for measuring the exact distance between the teeth at the cervical wall. By its aid wedges of the right thickness may be easily selected, and holes in the rubber dam cut exactly where they are desired. In case of a missing tooth these become more valuable still in determining the exact width at which the holes should be cut.

Besides all the modern improvements, we have the willing acquiescence of our patients. I think it is a mistake to suppose that they are not willing to encourage us in our efforts to do perfect work. They come to us because they believe we are good operators, and will do for them the best we can. If we ask them if they prefer easy and indifferent operations, their reply will almost invariably be that they desire our best efforts. If we consult their wishes in reference to permanent separations, we will find their common sense prompts them to object to that practice. No amount of sophistry can overcome their instinctive aversion to it.

Can we ask for more than this to encourage us to restore the teeth in as perfect a manner as possible?

There are still other considerations.

Many eminent operators concede that restorations are actually best, but they continue to make separations because they are easier, and because it is hard to change the habit of a lifetime. This will be corrected in time. Younger and fresher men are coming into the field full of courage and high hopes, and through their influence the dental profession is moving towards a higher standard of excellence. Here and there even gray-haired men are being stirred by this progressive spirit, and with touching sadness are wishing they might live their lives over again.

The logic of this is inevitable. Our profession cannot long rest content with permanent separations, as a general rule of practice. Such separations may have done comparatively well in the past, when nothing better was possible, but I cannot believe they will be tolerated by the practice of the future.

REPLY TO DR. W. C. BARRETT'S "REVIEW OF THE NEW DEPARTURE."

BY J. FOSTER FLAGG.

(Continued from page 205.)

Fifth (Reason): "If the presence of metals (which according to this new gospel assume a negative relation to the tooth) be the principle or only cause for decay of the teeth" (*nobody ever said it was, or ever had the slightest idea that it was, that I have ever heard of*), "then unfilled teeth ought never to decay, and there should be no necessity for filling teeth primarily, since one of the elements of the battery is then wanting, and, by consequence, there can be no tooth-disintegration. But, since this is not in reality the case, why may we not say that the same conditions which produce decay before filling do so afterwards?"

I quote the whole of this *reasoning* that my readers may judge for themselves of the *depth of the insight* into "New Departure" Basal Principles, which may be obtained by *four years' close examination*, and for no other *reason.*

Sixth (Reason): "In the consideration of any of the phenomena of nature, we never need search for a recondite cause so long as ample reasons lie near the surface, or in full view. A very sufficient cause for the disintegration of teeth after filling may be found in imperfect manipulation, and *direct chemical action* (the italics are mine), without appealing to electrolysis."

The *first article* of the creed of that which is "modestly" termed the "New Departure" is, "*In proportion as teeth need saving, gold is the worst material to use.*"

Now, I do not think it claiming too much to say that this "Article I." is *not* "as old as the hills," *as an enunciation*, though it may be *as a truth.* I do not think it claiming too much to say that *all former practice* has *not* been based upon a firm belief in this "principle."

Neither does it follow that because the "New Departure" claims that *gold* is the *least saving in proportion* to the *need for preservation*, that a tooth will "decay faster" if filled with gold than it would if left unfilled.

The "New Departure" *knows* just as well as its opponents *know* that a tooth of such soft structure as to be in *great need* of help for preservation will *not decay as fast* (at least for a time) as the same tooth would unfilled; but it also *knows* that decay *would be permitted* sooner with a *gold* filling than it would be with an *equally well introduced* filling of *good amalgam;* and it *knows*, further, that this amalgam filling would *permit decay* (not *cause* it) sooner than would a filling of *tin;* and it *knows* that a filling of tin would *permit decay* sooner than would a filling of *gutta-percha;* and the *fact* that a *gold* filling would preserve a *soft tooth* in an *articulating cavity* longer than a gutta-percha filling would is *no* WORTHY *argument* against this *principle*, *because* the gutta-percha would *wear out* before the gold would *permit decay.*

The "New Departure" *knows* that the great mass of intelligence in dentistry *knows* this also; for it is increasingly informed of it by *every day's mail!*

Now, under the head of Article I. the "New Departure" says, "If gold *is* the worst material to use, there must be some scientific reason for it;" and *as the reason* gives the following, "We have the best reason for assuming that all CHEMICAL ACTION invokes *electric* disturbance. Now, acid fluids do act CHEMICALLY on bone, *and the presence of a good conductor, which is itself unattacked*, must, on general electrical principles, assist the *electro*-CHEMICAL action."

This certainly refers, and I should think with sufficient clearness, to "direct chemical action;" it certainly leaves no need for a "search" for any "recondite cause" upon the part of any one who *really desires to investigate*, and makes of this Sixth reason "for believing the 'New Departure' a fallacy" merely such a *repetition* of New Departure views as to lead fairly to the conclusion that the "four years" has been devoted to *not understanding* a principle that has been, we think, very clearly enunciated, and which is as *true* as it is *clear*.

Seventh (Reason): "In any case an electric current is but one of the factors in the sum of tooth-decay; whereas, *by the terms of this new doctrine*" (the italics are mine), "it is elevated to the importance of being the only cause worth taking into account (see Articles II. and III. of the 'New Departure')."

The Article II. referred to directs attention to the long discussed question of "contour" and "separation." It takes ground that "contour fillings" and "fillings in separations" both fail, and argues, *therefore*, that something more than the *shape of a filling* or the *filing apart of the teeth* must be studied in connection with the *arrestation of decay*. That is how electricity is elevated in that article!

Article III. combats the "accepted teaching" that "failure in operations is *mainly* due to defective manipulation."

The "New Departure" merely thinks it *very strange* that, with all the instruction which has been so elaborately given in regard to packing gold, and with all the warnings which have been sounded in relation to the "vulnerable spot" at the cervical wall, the splendid works of the very best operators should *continue to fail*, just as they *have failed* during the years gone by.

Surely the cervical wall *can be* properly prepared; surely the *first* pieces of foil *can be* properly introduced; surely they *can be* solidly impacted; surely they *can be* accurately adapted. If these things (acknowledged to be *essential to the integrity* of the filling) cannot be done, *then they ought not to be charged for;* and if they can be done, *and are done, why* is the failure "*due to defective manipulation*" almost always at that point?

This is a question which in its pertinence becomes almost impertinent.

The "New Departure" answers that this failure is *not due* "mainly" to defective manipulation, for it assumes that if there is any perfect manipulation during the whole process of filling, it is reasonable to presume that it is just at this point. But it also recognizes that in teeth of soft structure, largely organic, more moisture can reach that face of the filling *through the tooth-tissue itself* than can reach any other face within the cavity.

It teaches that moisture, having passed through the organic tissue of the tooth, finds itself in contact with a *bright-surfaced metal.* That to the *chemical* disintegration of tooth-structure by moisture is added that galvanic action, which is excessive just in *proportion* to the "difference in potential" between the two materials in contact.

It teaches that, AS THE RESULT of this action, decay must be even increased, rather than in any way retarded, and that with this increase a greater evolution of *electricity* must be the RESULT.

And this is how electricity is "elevated" into the "only *cause* (?) worth taking into account" by that article!

If such peculiar perversion of teaching was in any degree *general;* if, on the contrary, it was not gratifyingly *exceptional*, it would be a task indeed to correct misapprehension; but it is encouraging to see, by reports of discussions, and by articles from able pens, and to learn, through the medium of correspondence, that a great many "investigators" are examining into this theory, not for the purpose of proving that "electricity does not decay the teeth," but for the purpose of trying to discover *whether or not a principle is taught which may so guide practice as to eventuate in greatly* PREVENTING TEETH FROM DECAYING.

With the greater part of the deductions drawn during the progress of the enunciation of the *eighth* reason *I fully agree;* but with the premise that the "new theory is *fraught with evil* to the dental profession" because of these deductions *I do not agree.*

Young dentists *are taught* that the "years of patient, steady, persistent effort" to reach that plane which enables them to make tedious, painful, expensive "failures, from defective manipulation," had *better be employed* in efforts of a different kind.

Young dentists *are taught* that what seem to be "firmly established" principles are so shaky that they are fearfully stirred up, and bid fair to be completely "swept away" by *this blast* from the discordant "New Departure" trumpet.

Young dentists *are taught* that the easily manipulated plastic fillings *are*, in very many cases, much better than the best efforts, *in gold*, of the best operators; *and they are taught how to discriminate when such cases occur in practice.*

Young dentists *are taught* that leaky fillings of some materials (gutta-percha) are better, in some instances, than the tightest fillings which can be put into the same cavities of some other material (gold); and they are taught *why* this is so. (See Article VI., New Departure.)

Young dentists *are taught* that "the boys just commencing their career" *can save soft teeth better by using plastics than by using gold*, and that they can by this method insure for themselves a *far better record* than that of the Methuselahs in practice, who have wasted their energy in "accumulating" that "practical knowledge" of working gold in soft teeth, which has eventuated in permitting these "priceless pearls" to disintegrate and pass away, and their places to be filled by "incorruptibles" on bases of rubber, gold, and platinum.

(To be continued.)

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson, M.D.

Double facial abscess.—You will observe, gentlemen, that on either side of the region of the face overlying the body of the lower jaw of the patient before us are two ugly, pus-making ulcers. These ulcers have now existed about eight months, and certainly do not show the slightest promise of getting well; they are chronic and asthenic in expression to the last extent; more than this, the young man looks as if in a fair way to find himself galloped out of life by a consumption. He is in that condition well expressed by the term "run down."

A first premise in every surgical condition is that cause precedes effect. What is the cause of the ulcers in the case before us? Why do the ulcers not get well? In the answers to these questions we are to find both diagnosis and comprehension of the case.

In search after cause, I begin by removing from the faces of the ulcers the disgusting matted mass with which we see them covered. Our patient is certainly having an uncomfortable time. He cannot shave, neither can he keep his beard clean of the clotting discharge; he indeed lives with a dirty face; he is not, I am sure, invited out to dinner parties.

. . . The parts being now exposed, we are to look if there be expression secondary to that uncovered by us. . . . Here is an ordinary silver probe; I start by seeing if a sinus is to be found. Here is one already. The probe is passing in the direction of the ramus of the jaw. . . . Now it ceases to be obstructed. . . . It has now passed into the oral cavity.

Opening the mouth, I want you to observe that the point of egress of the probe is a little above the junction of the body of the maxilla with the ramus of the bone.

Now, I turn the other side of the face and repeat the trial. . . . The result is the same, the probe goes in a common direction; there is, however, on this side, no opening into the mouth.

Are we getting at our diagnosis? We will ask the young man his age. "Twenty-two," you hear him say. Let us look at his wisdom-teeth. He has none; at least, he has no development of these organs except a single cusp of each pushed out of the gum, being almost concealed from sight by the overlying anterior molar.

We have, gentlemen, the diagnosis. At least, I think we have. The irritant lies with these teeth. I will request Prof. Dorr to extract them. . . . The teeth are now out. What is to be done next? Nothing. The case, relieved of the incubus, should cure itself.

At a clinic two weeks subsequently the patient in the above case re-presented himself; he was certainly nothing better.

Dr. Garretson. Here, gentlemen, is our patient of two weeks ago. He is not well. I think, indeed, he looks worse. Have we been wrong in our diagnosis? We will look again. These sinuses have not made the slightest attempt to cure themselves; there is a reason for the indolence or inability, whichever it may be.

Now, as to the cause I am sure we are right; the probe still points to the situation of the wisdom-teeth, and points nowhere else.

It is quite possible, however, that a chronic inflammation existing so long, as in this case, may have provoked disease of the bone. If this is the case, the probe should reveal that structure uncovered by its periosteum. . . . After so prolonged an exploration, I discover no exposed bone. What now are we to say? There is only one thing to say, or rather to infer, namely, that the vis vitæ of the patient is too feeble to repair damages. At the present point of the case this is all the direction we can induct. I will order the young man tonics. I will prescribe for him the muriated tincture of iron, and also a tablespoonful, repeated four times daily, of some of the cod-liver oils that are medicated with the hypophosphites of lime and soda. Another medicine applicable in these cases is tannic acid. I offer here a hint to medicine compounders which is worth an endowment to your college. This hint considers a combination of tannic acid with ol. morrhuæ. With this combination, made extempore, I believe I may justly say that I have cured phthisis pulmonalis; at any rate, if, in the universe of medicinal remedies, there is anything yet discovered to be an approach to a specific for tubercle, that thing is tannic acid. Make a note of it, young gentlemen.

The case of this young man is one to enlist very close attention on the part of the class. I fear that sooner or later caries may complicate the matter. We can do nothing more, however, than keep the wound thoroughly cleansed by gently stimulating injections, and feed up the furnace of his physical forces with the strongest burning coals at our command.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular meeting, held at the residence of Dr. Safford G. Perry, No. 10 East Thirty-fourth Street, on the evening of January 21, 1879.

Vice-President Dr. A. C. Hawes in the chair.

Incidents of Practice.

Dr. C. H. Biddle, Brooklyn, N. Y. The case to which I would call attention is one of facial neuralgia; the patient a lady, of nervous temperament and anæmic condition, aged thirty-three years.

On the 18th of last month I filled the distal surface of the second right superior bicuspid with gold, there being at the time a large gold filling in the anterior surface. The appearance of the tooth, and its failure to respond to any thermal change, naturally led me to think it had been devitalized, and the conclusion I arrived at was that the anterior filling involved the root.

For three years the cavity had been filled annually with oxychloride of zinc; two years by a brother dentist and one by myself. My reason for so filling was because the tooth seemed frail.

The operation of the 18th instant was performed without difficulty, and at no time did the lady complain of pain or distress. Ten days after the operation the lady experienced paroxysms of pain through the right eyebrow, extending down the side of the nose. January 1, she was treated by her physician for neuralgia, and I examined the teeth carefully, knowing how prone they are to create such disturbance and how vague and difficult the diagnosis is in such cases; but the examination developed nothing abnormal about the teeth or gums. I allowed her to leave, hoping the constitutional treatment might benefit her; but she returned on the 2d, as the pain still continued, located in the frontal branch of the first division of the fifth pair of nerves. I removed the filling, dried the cavity, and saturated its walls with creasote, but the anticipated relief did not come. The same day cut into the tooth, and at one point (the buccal horn of the pulp) discovered slight sensation at a very minute point, as though a single tubule was exposed. Creasote not acting kindly, wine of opium was substituted with happy results as to quieting the pain.

On the 3d the pain returned. I was nonplussed, as we naturally expect to give relief when the cause of irritation is removed. Again I cut away more of the dentine, giving but slight pain, and, after dressing, the rest of the day was spent in comparative ease.

On the 4th came a recurrence of the trouble; and in sheer desperation I cut into the pulp-cavity, giving but slight and momentary pain. The pulp was situated far up in the tooth, and appeared to me as though it had retreated before the oxychloride, although it did not ache while that preparation was in the cavity. When I cut through I did not get a drop of blood or pus, but found a puny, half-dried specimen of a pulp, with barely life enough to respond to the touch of the instrument.

The lady was comfortable, and on the 5th I made an application to destroy any remaining vitality in the pulp, which remained for twenty-four hours, giving no trouble; in fact, it was the only full day in a week when she was free from pain. On the 5th I removed the application, and found the pulp entirely devoid of sensation. Placed a temporary filling, which I intended to leave in a few days, not anticipating any trouble; but in an hour I was obliged to remove it, as the pain returned. On the 7th I removed the pulp entire without causing any pain. For the succeeding week I adopted palliative treatment, as there remained a latent pain in the eyebrow, and then permanently filled the root; since which time the lady has been free from pain.

I relate this case because of the several peculiarities attending it: 1st. At no time was there any pain in either the tooth or the surrounding tissue. 2d. No response at any time to thermal change or percussion. 3d. The patient was free from pain every night. 4th. The condition of the pulp,—so nearly atrophied that in opening into the pulp-chamber neither pus nor blood exuded; and, 5th, that wine of opium acted kindly and gave relief, while creasote tended to irritate and intensify the pain in the nerve involved.

Dr. N. W. Kingsley, New York. An interesting operation was performed in my office a day or two since by Dr. Richmond.

The case was a broken-down bicuspid upon the left side of the upper jaw of a young lady who had been a patient of my brother in Paris.

The external half of the tooth had split off, and a portion of the inner cusp was also gone, and my brother had replaced it with a porcelain face, made of a plate tooth, to which was soldered a pivot going up into the root, and the space inside the porcelain filled with amalgam.

It had loosened in time, and she came to me to have it reset.

As it was an excellent case upon which to demonstrate Dr. Richmond's plan, I called him in, and the result was one of the prettiest operations I ever saw. As some of you are not familiar with his plan, I will describe it.

What remained of the crown was cut off nearly even with the gum, and a narrow band or collar was fitted accurately around the stump, which passed under the gum and out of sight. To this collar was attached, by a lining and solder, the porcelain face, which was made by using a small canine plate tooth.

The inner cusp was restored by making it a hollow shell of gold. The face and shell were united. When set in its place, the shell was filled with oxychloride paste, and a screw passed through the crown into the root.

The principal advantage which this plan possesses is the collar which surrounds the root and passes under the gum, thus protecting the stump in all probability longer than any other method.

Previous to the setting, Dr. Richmond inserts a hollow screw into the root, which in turn becomes a nut, and receives the screw afterwards passed through the crown. This plan may also have the advantage of giving more steadiness to the crown than any other way.

My only misgiving is in regard to the permanency of the operation. Dr. Richmond assures me that in the mouths of his patients they have remained unchanged for years, and I can see reasons why they ought to be much more durable than pivot teeth set in the ordinary way. As a nice piece of mechanism they are certainly perfect.

Dr. Frank Abbott, New York. The process which Dr. Kingsley has spoken of I attempted to perform myself not long since. I had made an appointment with my patient for a certain day, supposing that I could readily obtain the services of Dr. Richmond to do the work for me, but was unable to find him. I postponed the operation for several days with the hope that I would ascertain where he was, but when that appointment arrived he was as hard to find as he had been before, so there was no alternative for me but to go ahead and do the best I could.

I varied the operation from the way in which Dr. Richmond performs it, in this respect: instead of putting a gold socket into the root, I carefully fitted a bit of condensed hickory wood, into which, after fitting the crown, and placing it in position, cemented with oxychloride of zinc, I drilled a hole the size I required for the screw, which was to retain the crown, and screwed the crown fast. Necessity, which is said to be "the mother of invention," rather compelled me to perform this operation as described. I believe, however, that the tooth is as secure (possibly more so) as those set in the exact manner described by Dr. Richmond. I do not wish, however, to be understood as attempting to steal any of Dr. Richmond's thunder. His is a very pretty, and certainly useful operation, and he is entitled to all the credit for its introduction.

I have recently had three patients—all ladies—present themselves at my office with teeth split, apparently through their centers. I have attempted to save them, and I think I shall succeed.

The operation of fastening the two parts together is as follows:

I first tie them together as firmly as possible with silk, and dismiss my patient for a day or two, to allow the slight periosteal irritation to subside. I then grind or file off the anterior and posterior surfaces of the tooth, in order to give it a slightly conical shape, fit a thin band of platinum as perfectly to it as possible, flow gold over this band until it is strong enough to hold the strain of driving it on to the tooth, then, with a mallet and an instrument adapted to the purpose, drive it on until the two parts of the tooth are as perfectly fitted to each other as it is possible to get them, then treat the tooth, in other respects, the same as though it had not been fractured.

Some eight years since I treated a tooth in this manner for a gentleman, and it has done good service ever since.

Dr. Richmond, San Francisco. In cases like that first spoken of by Dr. Abbott, I have been in the habit of first thoroughly cleansing the cavities, and then setting a cylinder in the root in amalgam, or os-artificiel, so that it will hold firmly. This gold cylinder has threads on both the outer and inner surfaces, and the filling around the cylinder engaging in the thread, makes it as firm as though screwed into the root. I prefer this method to that of the wood plug described by Dr. Abbott; yet, doubtless (and particularly if the end of the root and the wood are well protected), his operation will remain successful for a long time. My method of securing exact apposition of the holes in the crown and in the gold screw in the root is as follows: After the gold screw is properly set in the root, I insert a wire into the root-cylinder and surround it with a small platinum tube; which, being afterwards filled with sand and plaster, and soldered to the crown, the two holes are necessarily found in line when the crown is completed.

A paper on "Dental Caries in Human Teeth—History,"* by Dr. Frank Abbott, was read by the author.

Discussion.

Dr. Abbott. Before taking my seat, I wish to make a remark in reference to a discussion upon the subject of "caries," which occurred at a meeting of this society not long since. When the recent work of Magitot upon this subject was referred to by Prof. Heitzmann, Mr. Dexter, and myself, Mr. Dexter made the remark that Magitot stated that a reaction took place on the part of the dental tissue when attacked by caries upon the surface. He (Magitot) says that a phenomena of reaction takes place, which manifests itself by the appearance of a cone or white zone, formed by the obliteration of canaliculi, and which he calls the formation of secondary dentine. This condition of things he sees with a power of two hundred and fifty

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* This paper was published in the Dental Cosmos for April.

(250) diameters. With a power of one thousand (1000) diameters we readily see the "cone, or white zone" that he speaks of; but, instead of its being an obliteration of the canaliculi by an extraordinary deposition of lime-salts, it is a partial decalcification and inflammatory reaction on the part of the living matter in the tooth-substance.

Dr. Wm. H. Atkinson, New York. I am not in good condition to speak to-night, but am ready to tell of my interest in this very interesting question. Let me commend the succinct manner in which what is known of dental caries has been presented to us to-night, and also the wisdom of not assuming to make interpretations beyond what the facts will bear out. Also, I note important observations that have been made very lately, and wish to warn all who care to know anything about it against claiming more for the late efforts than really belongs to them; and this brings me to the point to ask the question directly, What is the difference between the apprehension of the best and latest investigators and the apprehension of those who have heretofore been recording their views of the methods of dental decay? If I were disposed to some self-glorification about this, I could make a good point. It is simply this, that we are more free from the domination of authority than the older observers were; having been ourselves misled to such an extent by following the dictum of falsely-assumed positions that we have learned the humility to make every case as clear before our eyes as we could, presenting the example as we saw it, never allowing ourselves to give the final interpretations until they are revealed in our consciousness so clearly that each pupil might also have the same revelation by examining the same specimens.

The difference between the present apprehension of pathological activity in tooth-substance and that which has prevailed up to this time is this, that all pathological activity is but a reversal of physiological activity; that it is a retrogressive process, reversing the progressive process of original formation and nutrition of any of the tissues. This holds throughout the entire system, whether it be soft or hard. How do we interpret that there is a modicum of vital action in the enamel? We do that through the assistance of a gentleman whom I revere, who is present to-night, who did see that protoplasm is organic,—that there was an organized condition indicative of what we call vital action even in the simplest form of the amœba,—and that was the type of the elements of all the tissues. If the type of the elements of all tissues, necessarily the type of the elements in tooth-tissue. Then what is the difference between enamel and dentine? A difference of degree of calcification only,—that is the difference. Then what do we suspect? That in so far as retrogressive action is not purely chemical it is a reversal of nutrient activity or formative energy. Then where do we look for the greater amount of resistance? Where we have the greater amount of living matter. And I am aware of the difficulty of making this discrimination between living and non-living matter, if I must contradict my own consciousness when I say that anything is non-living that is still organic, that is still crystalline; that there must be in the crystal the modicum of life, the life having awakened the energy of the atoms that flow together to constitute the molecules that are distinctly established in the granite rock. So that we ought to be careful about making the distinction between organic and inorganic, living and non-living. What shall we say of this magnificent discovery of Carl Heitzmann? I say "magnificent" understandingly and feelingly. For it has shown us a truth that is the key-note to the revelation of all visible activity. That is what has been *falsely nominated* "*protoplasmic granules* and *protoplasmic strings!*" If that slight error be corrected then we have the truth as it is in nature. That they are not protoplasmic strings and granules is clear to him who understands organic law at all, or who can think. What, then, produces the appearances that we have interpreted as strings and granules? A succession of little bags, that hold fluids that are more movable within these little sacs than the walls of the sacs; these present to us the appearance as if made up of strings. Think for one moment, those who are capable of looking at any process rationally, how could the amœba move if it were simply strings or network that communicated the fluid through or between the strings of the network? You say that would be an impossibility, a fluid traversed simply by a network of strings and their crossings. If you have followed me, I need not go any further into the argument that they must be made up of sacs; that all protoplasmic bodies are a series of little sacs, the exterior being a little more oxydized than simple *hydrate of carbon* (the interior), that we call vital, as distinguished from the non-vital; all of which I wish to wipe out, as Carl Heitzmann has wiped out the word "cell." I wiped it out before I knew there was such a man as he living. There was the same eye of light to reveal that to any of us, and, although I was the first to see it as I verily believe, I was in such an obscure position that I was not able to make rapid progress, and was misunderstood even by some of my best pupils. Then what is the difference? The difference is simply whatever it is that constitutes the type of tissue. How is it in enamel and dentine? As in the organs of the human body, that a certain degree of perfectibility up to a given type is what we call perfection, in the production of that, whether it be enamel-tissue or dentinal-tissue or connective-tissue, or any of the divisions we have made in the examination of tissue or in the organs.

Dr. George S. Allan, New York. I believe I am somewhat acquainted with the nature of the discovery of Prof. Heitzmann. I must emphatically protest against his conclusions being received without question, or, at least, thorough examination. Dr. Atkinson seems to say that the question of the abrogation of the cell, as formerly known, is a matter growing out of the new discovery. Now any one who will carefully read the first chapter of Stricker will find that the cell, as a cell-wall, contents, and nucleus, was done away with long ago. It has not been recognized for years, under the old definition, by physicists. On the contrary, it has been for a long time known only as a simple mass of protoplasm. So much of what we have lately heard, then, is not new. Now, as to whether protoplasm has a structure or not is a nice question. Dr. Heitzmann claims that it has, and he should, therefore, be in a position to prove it. All the prominent scientists of the day virtually accept a common definition of protoplasm, including certain fixed characteristics by which it can be recognized under the microscope under favorable conditions; and, under such conditions, no lens can determine between protoplasm and formed material. I would be the last one to throw doubt on any real discovery. This whole matter seems to have been handled in Prof. Heitzmann's laboratory with much care. I, therefore, ask that, if this discovery is real, it be placed before this society in such a manner (including the specimens) that those competent to do so may determine the truth of the matter for themselves.

Dr. Atkinson. If all the novices in the world were to come together and solemnly declare that ten times ten were not one hundred, would that make it so? Could you convince any individual who had had the truth of the relation of numbers revealed in his own consciousness, that it was possible that any other relation should hold or could hold? I *know* to what I testify, because I have seen it. Any individual that desires to know whether the amœba is organized or not can easily prove that thing by a very easy method, and not with any extraordinary glass either. Had these persons been at the Academy of Medicine the other night, when Dr. Ellsberg presented his paper and specimens on the structure of the blood-corpuscles, they could have been satisfied by their own eyes.

Dr. Allan. Dr. Heitzmann's discovery is, as I know, called in question by others beside myself. Other educated eyes ought to be able to see the new things; and, having seen them, others should be able to repeat the experiments in their own laboratories and with their own instruments. No one substance in the world has been the subject of so much careful, critical, and painstaking investigation as protoplasm. Why? Because it is recognized by all physicists as being at the very foundation of organic life. I question this new discovery because I want to see and know the new processes and results for myself; for, until we can do so, I think we should be somewhat cautious about accepting these new theories as proved.

Prof. C. Heitzmann, New York. The essential point in Dr. Abbott's work is his demonstration of the fact that in caries of the teeth (although it is originally a chemical process) the medullary condition of the tooth-substance reappears. In inflammation of the other tissues the protoplasm is known to be reduced to its embryonal condition; and Dr. Abbott has proved that the same thing occurs in the teeth.

At the last meeting of this society, Dr. Allan warned us against accepting as proved any doctrines which are not accepted as proved by the majority of competent observers. In this I heartily agree with Dr. Allan. When he says that the works of Max Schultze, Beale, Recklinghausen, and Stricker do not tell him anything about the structure of protoplasm, I am not surprised. Max Schultze described protoplasm as being the basis of life in 1861. Beale promulgated his theories of living and formed material in 1862. Recklinghausen introduced us to the phenomena of motion in 1863. Stricker published his article on the cell, in German, in 1868, and it was translated into English a few years after. But did histological progress end in 1868? Dr. Allan should remember that eleven years have passed since then. In 1873 I published my discoveries, based upon two years of observations made in Stricker's own laboratory. At that time, I admit, I was alone in the belief that the structure of protoplasm is plainly visible. The idea was not at once generally accepted, because it was too new; but, since "truth is immortal," its acceptance is only a matter of time, In 1875, shortly after my arrival in this country, Dr. J. J. Woodward, of Washington, published photographic plates of certain specimens, under relatively low powers, but by intense oxy-calcium light. In these photographs the structure of protoplasm (where that substance is in correct focus) can be seen with the naked eye. There are two ways to prove such a discovery as mine: first, to demonstrate its truth unwittingly, as was done by Dr. Woodward and his truthful microscopes and camera; second, by a careful inspection by trustworthy and unprejudiced observers. Dr. Louis Ellsberg has been one of these, being now fully convinced of the truth of the matter. Also more than a dozen of the best observers in Germany, France, and England have announced a like opinion. In the *Quarterly Journal of Microscopical Science*, July, 1878, E. Klein gives a full history of the discovery of the structure of protoplasm. Stricker, in several articles, announced that he could see the structure of the nuclei only; but last week I received from Vienna the second volume of his "General Pathology," in which he confesses that the reticular structure of protoplasm furnishes the only basis for the proper understanding of the phenomena of life and the structure of the tissues. This progress of belief in things so new and important is very gratifying; since, in science, things are studied carefully and accepted with deliberation in just the ratio of their intrinsic value.

Dr. Allan. As I have already said, protoplasm has been the object of the most extended research by microscopists. If Prof. Heitzmann's discovery is real, he has made it either because his lenses or his methods of observation or preparation are superior to those of other microscopists. I did not refer to Stricker to prove that protoplasm was structureless; I spoke of him to prove that the cell doctrine, seemingly asserted by Dr. Atkinson to be in vogue at present, had really been discarded as far back as the date of Stricker's work. By all the writers of that day the cell was regarded as a simple mass of protoplasm. I have seen the photographs of Dr. Woodward, to which Prof. Heitzmann referred. Dr. Woodward would have us believe that protoplasm is, at times, structural, and at others not so; that is, that it is structural or the reverse, according to the conditions under which it is seen. Unless it is in a free condition, or in cells, and can be subjected to the straining process, any microscopical examination will not determine its character. Yet this is what Prof. Heitzmann claims he is able to do, and is what I question.

Prof. Heitzmann. The assertion that the cell is not a vesicle, but a simple lump of protoplasm, was first made by Max Schultze in 1861; and since that time the term protoplasm has been in use. If Dr. Allan asserts that protoplasm has a structure at one time which it has not at another, he is mistaken. All writers agree that protoplasm must possess a structure, since it is a substance. The question is, can we see this structure? That there is a structure all admit. I was merely the first to see it. Dr. Woodward did not say a word about protoplasm in his work. Dr. Allan speaks of my lenses. Originally I used lenses made by Vérick, of Paris, with which I saw things which others had failed to see. There is little difficulty in seeing things of which some one else has told you; the question comes only as to the first observer. Since I left Vienna I have used lenses of Tolles, of Boston, and of Grunow, of this city; and with them find the same protoplasmic structure which I before saw with the foreign lenses. The lenses of Tolles and Grunow are superior to any made abroad. My illumination is good, because I use the concave mirror, never the condenser. As to my method of preparation of protoplasm, I simply try to keep it alive as long as possible, by the use of grease on the cover-edges. I extend a most cordial invitation to Dr. Allan to come to my laboratory and examine our specimens and our methods of working.

Adjourned.

FIRST DISTRICT DENTAL SOCIETY.

A regular meeting of the First District Dental Society of the State of New York was held on the 7th day of January, 1879.

Incidents of Office Practice.

Dr. R. M. Reynolds. I wish to relate a case that has come under my care within a short time. The patient is now about ten years of age. When she was seven years and a half old, in going up the steps of her father's residence, she fell and struck her face upon one of the stone steps, driving the two central incisors entirely into the jaw, so that, after three or four weeks, when all the swelling had subsided, the teeth were still above the margin of the gums. She was taken to a dentist in Cincinnati, where they were living at the time, and he said the teeth were probably broken off. The child was placed under my charge while I was in Paris last summer, about sixteen months after the accident, and as I had not the time there to attend to her, I postponed treatment until I returned to New York.

The teeth were allowed subsequent to the injury to come down of their own accord, as they would have come in the natural order of development. They made their appearance again, and attained the ordinary length, in about seven months, and, as nearly as the lady could describe the case to me, about as teeth would come in the first instance. I examined the teeth about a month ago, and decided as a matter of course that they were both dead, and also that the teeth had been fully developed when the accident occurred. I found both of the roots about the shape of a goose-quill cut off at the smaller end,—a very little larger, perhaps, at the crown than at the apex of the root. One of them I found fully one line shorter on the labial surface of the root than on the lingual. I have succeeded in arresting the suppuration, which was going on at a rapid rate in one of them. I saw the patient to-day, and I find that the other tooth is still in a bad condition. I never saw a case like it before. I have removed at three different times from the one on the left side a sort of fungous growth which had worked itself down into the pulp-cavity, which I examined under the microscope without much satisfaction or information to myself. I mention the case here for the purpose of getting the opinions of others in regard to the possibility of saving those teeth, at least for a few years. The goose-quill shape of the inside of the roots to which I have alluded, as though they had been drilled out, was, I presume, caused by suppuration. You would not know except for their being slightly discolored that anything had happened to them. The mother, a very intelligent woman, informs me that three or four weeks after the swelling had entirely subsided, it was necessary to throw the head of the child back in order to see the teeth.

Dr. Atkinson. How did you ascertain the length of those teeth? Was it by boring through the lingual borders? Was there any necrosis of the alveolus around the necks of the teeth?

Dr. Reynolds. The first thing I did was to drill through the lingual borders. There was no necrosis of the alveolus.

Dr. Atkinson. This case as stated is, as far as I know, unusual. We do not know enough to assert much about it positively, but I suppose that the mass that the doctor speaks of removing from the pulp-chamber of one of the teeth, upon proper examination, would have proved to be embryonal matter which nature threw out for the purpose of restoring the breach, and that the suppuration resulted from the retrograde metamorphosis of that substance. As to its being a solvent for dentinal construction I have my doubts. We ought to be careful and not be too positive as to the time when calcification is complete, and not be led too much by the statements of incompetent observers as to the conditions. The only reason why I accept the statement as made is, that Dr. Reynolds, whom I regard as a competent observer, said that the edges of the teeth were on a level with the margin of the gums in their normal condition as late as the time when he saw the case in Paris. That makes it very remarkable, and involves a number of very interesting histological questions as to the condition of the junction between the connective tissues and the alveolus in which the teeth rest. I ask the doctor to present the patient at our next clinic, because I think it an instructive case.

I wish to speak of an incident of my own office practice. A child of the same age, a bright boy, fairly organized, with rather a soft constitution, flabby flesh, and soft, easily hung, and flexible joints, so that one can bend his fingers back and touch his wrists without hurting him, was presented for advice. The cutting edges of the central incisors had been broken off by a missile in the hands of a playmate. One of them was broken clear across the tooth. If you comprehend the kind of constitution indicated in what I have said, and recollect that in such the two plates of enamel, the labial and lingual, oftentimes come in contact with each other and form the cutting edge of the tooth near the inception of the enamel until you get up one-quarter or one-third the length of the tooth, you will see that these teeth were liable to fracture by a clip. The accounts stated that the teeth were not uncomfortable further than from the roughness of the edges, and a slight tenderness for several weeks after the injury. I decided that the proper course to be pursued was to trim off the edges, which I did with a thin disk more accurately and delicately than it could have been done with a file, and in a very much shorter time. I then discovered that the right inferior temporary molar had been removed previously and the first bicuspid was well through, and no appearance of the second bicuspid. The first permanent molar was badly decayed, the pulp dead, and with a morbid growth around the roots.

I looked at the other, the left inferior permanent molar, and found it in like condition so far as the tooth was concerned, but not so far dissolved and broken down in the lingual border, and I said to the aunt who brought the child, "These are the teeth that I advocate the preservation of, but, unfortunately, this child has been neglected too long to enable me to tell you that any effort, however persistent, can be crowned with success." And if these teeth are extracted it involves the absolute necessity of extracting the upper ones corresponding to them, which were not decayed so much but that they could have been saved very easily. There was very considerable objection made by the aunt, the mother having been unable to come. I said, "I suppose the mother sent the child to me for advice, thinking I knew better than she did." She replied, "She wishes you to do whatever you think best," "Then," I said, "I will extract these four sixth-year molars." I extracted the teeth. The lower molars were covered with the embryonal growth that I have already indicated around the roots to the end. The upper roots were clean and pure and healthy as far as I could judge.

Dr. C. S. Stockton. I had a patient to-day, who, from the time of making the appointment, had had considerable trouble in her left superior canine. It was sore to the touch. The tooth was perfectly sound, and there was no dead tooth anywhere near it. My diagnosis was that the pulp was dead. I drilled into it, and found that to be the fact. Why should that pulp have died? The patient is a lady about nineteen or twenty; in fine health and having a fine set of teeth. She does not remember ever having had a blow on that tooth. My next patient was a young girl about fifteen or sixteen. In 1874 she had a tooth filled. The pulp was exposed and capped over with gutta-percha. The tooth never gave her any trouble until about a year and a half after it was filled. Then she had considerable pain in it, and by some application she got rid of the pain. To-day I removed the filling, which was of amalgam, and found that the pulp in the palatal and anterior buccal roots was dead. In the posterior root the pulp was alive. I cleansed the palatal and anterior buccal roots, and filled them with oxychloride of zinc; cauterized the pulp in the anterior root with carbolic acid and filled temporarily. To-day I filled the tooth permanently.

Dr. C. E. Francis. Dr. Stockton in relating the case of his young lady patient reminded me of a similar case. A young lady called upon me this afternoon with a devitalized canine tooth. She did not know the cause; had never received a blow upon that tooth. But still it may have been injured in some way. I think sometimes children in biting very hard substances—ice particularly—bring about these results. In playing blind man's buff I have known people to injure the teeth. Often little mishaps of that kind are overlooked and forgotten. I think the case of Dr. Stockton and the case that came to me must have been the results of mechanical injury.

Dr. Brockway. I had a case precisely similar to Dr. Stockton's, although it did not occur to-day. A young lady about twenty was having some operations performed in her mouth, and I noticed that the right lower central incisor was slightly discolored,—so slightly, however, as scarcely to attract attention. I diagnosed a dead nerve; drilled through and found it so. The patient was not aware that she had ever received any injury to the tooth. I do not see how a blow, unless it should be a very severe one, would be likely to produce death of the pulp. Certainly, we are in the habit of giving blows to teeth in the process of filling them, and sometimes pretty severe ones, but I have never known but one case of death of the pulp occurring from them.

Dr. Francis. A gentleman called on me within two weeks, who said one of his central incisors was very sore to the touch. The tooth had an opaque appearance. He said he was playing blind man's buff, and his tooth came in contact with some of the furniture, though the blow was not severe. I opened into it and found the pulp dead.

Dr. Perry. I would like to ask Dr. Stockton what advantage he thinks is gained by capping over the pulp in one of the roots, the other two roots having been filled.

Dr. Stockton. I do not know that there is any advantage except the mere gaining of time. Under all the unfavorable circumstances the pulp in the posterior root had remained alive. If it could live with those surroundings, it ought to live with healthy surroundings.

Dr. Perry. I cannot believe that Dr. Stockton was quite correct in his practice. I am afraid he will have trouble with that tooth some day. To attempt to save the pulp in one root when the other two are dead is no advantage as far as I can see, and there is danger of trouble ahead. Dr. Stockton speaks of the pulp having retained its vitality; yet the other two roots died. We know so well that when the pulp is entirely removed, and the root filled so carefully that there shall be no infiltration, the covering membrane of that tooth will be so safe that I should feel more secure in taking out the pulp and filling the root as carefully as possible. In a case of that kind the periosteum is of chief importance.

Dr. M. H. Dodge. I had a peculiar case about a year ago, a young lady about eighteen years of age, with the central incisors, both inferior and superior, dead. She came to me in much pain. I was satisfied that the pulps were dead in those four teeth. She said she did not know why they should have died. I opened into the pulp in the right superior incisor, and found it dead; filled immediately, and there was never any trouble from it. The left one she decided not to have operated upon then. About two months from that time she had an abscess and fistula from that tooth. I opened that and filled it, and she has had no trouble from it. I treated the two lower ones in the same way, and she has not suffered from them since. The lady had a very short upper lip; I concluded that she must have gone out in the cold and chilled the nerve.

Dr. Mills. I had a case two or three months since, of a gentleman of thirty-five years of age, who had the pulp of two central incisors destroyed at about the age of ten, by a blow. Nothing had been done about it up to the time I saw the case. One of the teeth had turned to a straw color. I insisted upon opening into it, but it had given him no trouble, and he did not see the necessity of stirring it up. I told him I thought it would prove favorable to his tooth before I got through with it. I opened the tooth, and the result was very similar to that Dr. Brockway has described. He is a brother of a very prominent physician in Brooklyn, who had been treating this gentleman something like eighteen months for catarrh. I treated the tooth and cured the catarrh.

Dr. Atkinson. In the case recited by Dr. Stockton, what is the question involved? It is the nutrition, Dr. Perry says, of the periosteum and of the connective tissues that cover the root and line the socket. Whence is the nutrition derived that supplies the cement that lies directly under this membrane? Principally from the periosteum, most men would say. I am sorry they are not better posted. If they would study the intimate structure of the human body, then they would know better and feel more solicitous to preserve even the fragment of a pulp that is at the very apex of a root of a tooth, for the purpose of keeping alive the filament of the nerve that comes from the main branch down into the pulp. Now for the competency of the examination, and why two of the canals were occupied by dead pulp and the other one by living pulp. The very fact of the slough, and its coming away readily out of the pulp-chamber, and the other two roots was positive proof that nature had already set her dictum to work to limit this process wherever the slough took place, and there were already embryonal corpuscles thrown out, so as to protect that pulp which was purified by carbolic acid.

Dr. Perry. The point is simply this: Is there enough to be gained in attempting to save that third pulp alive to justify the risk? When I speak of guarding the periosteum as much as possible I have reference to the consequence which follows. The patient goes away and comes back some day with a swollen face. Now I say the chances for that swollen face will be lessened if that pulp is taken away at once. Don't let us lose sight of that fact. It is not so much the matter of nutrition of the tooth,—it is the safety and service of it afterwards, because where there are risks involved in that way for other persons we ought to be careful. Let us take all the risks we choose for ourselves, but not for others. We know how often pulps die when conditions are most favorable. Now, I claim that conditions are most unfavorable for the safety of that pulp for a lifetime. We have all seen cases of persistent pulp vitality. I do not doubt that it can be saved alive, I only deny the advisability of any such general practice. The pulp might remain alive. If it did, all well and good. But would the tooth be in better condition than it can be made by the nice care that can be given it? We must remember that a great many of the old practitioners did not cleanse and fill the pulp-chambers as we know it can be done now, and when that is done the tooth can be made a serviceable one, and kept so for a long time.

Dr. Odell. It seems to me the doctor answers his own question. He expects that the trouble will arise from the remains of this pulp. If we save it alive, where will be the remains? It is all alive and no remains to it. I wish to make a remark in reply to Dr. Perry or some other gentleman, who, in speaking of the death of pulps, wished to know if it was necessary that a blow should be given to cause the death of a pulp. Anything which checks the flow of the nutrient currents through the pulp, even for a moment,—anything which causes an obstruction, a sudden, profound sensation, although not in itself causal, may result in the death of the pulp. I have in my own family two children with three dead pulps, two of them dying immediately subsequent to shock, produced by biting simply upon the peel of an orange. They are all deciduous teeth.

Dr. Perry. I did not ask the question to which the last speaker referred. I would not like to be understood as opposing the saving of pulps. I can understand Dr. Atkinson's desire to save living protoplasm. He is all right if he don't go too far. I will meet any of you more than half-way in the saving of pulps, if reasonably exposed, in teeth that may be made serviceable, but I have not yet been brought up to the point of saving them in roots in this way.

There is a question I wish might be started. Dr. Atkinson has hinted at it. It has not been up for discussion for a number of years. I wonder how we stand now on the extraction of six-year old molars.

Dr. Atkinson. I am not advanced one single step further than confirming my former views. As to the case which I have reported to-night, I was not responsible for the child being neglected so long that those teeth were actually an offense to him, and so that he could not chew at all on the left side. You will bear me out that I have said that if it was necessary to extract one six-year old molar, then, on account of the morphology of the mouth, all four should come out. I could go into a very long recital of the reasons why this should be done. One of them, and not the least, is that in civilization there is not enough action generally brought to bear upon the masticatory apparatus; and when the sixth-year molars are taken out you are much more likely to have a good wisdom-tooth.

Dr. Dodge. Were the second molars erupted at the time you extracted those sixth-year molars?

Dr. Atkinson. I said the child was ten years old, and we must have had an irregular case of development. Whenever these sixth-year molars are very badly decayed, the only excuse to save them is that the twelfth-year molars have not come through. I have seen but two instances of a ten-year old child with a twelfth-year molar in my experience; and there would be a bad chance for a little fellow to eat for six months. Perhaps he had better eat on his bicuspids, and let the twelfth-year molars come into the place of the sixth.

Dr. Dodge. I have seen at least six cases where the twelfth-year molars were fully developed at nine and a half years; and I have seen two cases where the wisdom-teeth were fully developed at thirteen.

Dr. Atkinson. That is very good instruction. That involves another morphological question. Such people are very short lived; their ancestors probably died at forty-five or fifty years of age.

Dr. Perry. I think Dr. Atkinson has been making some very wise remarks. I am very unwilling in quite a number of cases in my own practice to have the sixth-year molars extracted. Perhaps I have done harm. It has been gradually forced upon my mind that there are cases where we will do better to have the sixth-year molars extracted, so that perhaps some of the old practitioners were right after all. I have in my mind one in particular,—a family whose custom it has been to have all the sixth-year molars extracted, decayed or not. Since coming into my hands I have saved the sixth-year molars. The result has been, after six or seven years, that the laterals have been lapping over the centrals; the wisdom-teeth have not had sufficient room, and there is an unsatisfactory condition in the mouth in general. And I notice that the other members of the same family, four of them, in every case—it being a family trait, mind you—had a narrow jaw, "V-shaped" (as Dr. Reynolds would say). With every other member of that family the teeth are in line, and no decay has taken place. For the cousins of this family, with the same family type, who have been in my hands longer, I have saved all the sixth-year molars. Six or seven have the same V-shaped arches and a tendency of the laterals to overlap the centrals as the wisdom-teeth came through. It has been a serious question with me if this family would not have been better off to have had the sixth-year molars extracted. I would not have mentioned this matter only that there are a great many young men thinking they must save all sixth-year molars. I believe that has been the accepted doctrine. I am inclined to think that a great many are saved that might better be sacrificed. I think Dr. Atkinson is correct,—if one comes out, let four come out.

Dr. Clowes. In regard to the sixth-year molars. There is nothing more interesting in the whole profession. I am so delighted to hear my professional brethren coming around to my side. I never had a hope that Dr. Atkinson would come around. Now only think of it! he says, "If you extract one sixth-year molar, you must extract the whole four." That is it exactly, either none or all.

In years past I have talked a great deal on this subject, and I have been about as emphatic as I could be about it. If I have a young patient under my care, and the parent or guardian says, "Do the best you can," I always extract them. Formerly I did not *always* do it. I had a few cases where the development was so splendid, the teeth so large and regular, that I excepted them. One of those cases I have seen within the last few days, and it is a wretched mess,—just because I left them in. They should *always* be extracted at the age of twelve or thirteen years. After that age the twelfth-year molars should be extracted generally, but not always. We should be governed by judgment. If we extract sixth-year molars at every period of life we shall make a mistake. There is a time when the twelfth-year molar is the proper tooth to extract. There are times when it is proper to extract the sixth-year molars, and there are times when it would not do at all to extract them. There are times when it is proper to extract even the wisdom-teeth.

Now in regard to the strength of the sixth-year molar. Dr. Atkinson seems to think it an excellent tooth. It is always a weak tooth. It is the weakest of all the molars, and you know it as soon as you look in the mouth of your patient. From three to five weak places are in the enamel, and from three to four in the twelfth-year molar, and the wisdom-teeth seldom have more than one. I have said that the wisdom-tooth is the strongest of all the molars. I proved it to you one night, but you said, "Why does the wisdom-tooth decay so early and so often?" I replied, take away the sixth-year molars and that allows the twelfth-year molars to come forward, and the wisdom-teeth to take the place of them, and then there is a perfect development.

The sixth-year molar should be extracted just about the time the twelfth-year molar comes in. If extracted too soon there may be a disarrangement of the teeth that have already erupted. I like to retain the sixth-year molars until the twelfth-year molars are just peeping through the gums.

Dr. Perry. I recall two cases where I have endeavored to arrive at this result by retaining the sixth-year molars and extracting the bicuspids. One of the patients was sixteen or seventeen years of age. I knew that something must be sacrificed, and I did not feel justified in extracting the sixth- or twelfth-year molars, and I extracted the bicuspids, that space filling up and giving more room. The other patient was from twelve to thirteen years of age. It is surprising, sometimes, how short a time goes by before they close up.

Dr. Francis. I would like to relate a case of a young lady who called upon me with a lateral incisor that was very badly discolored, and with an abscess at the apex of the root. I cleansed and filled the root. The other day I bleached the tooth by the method recently described by Dr. Atkinson. The lady was delighted. Thanks to Dr. Atkinson.

Dr. Mills. Perhaps I can add something on the subject of the sixth-year molars. I had a case in June of a young lady fourteen or fifteen years of age. Something of the character of constitution that Dr. Atkinson has described,—a poor organization of the teeth generally and a vitiated condition of the saliva.

She had an overcrowded condition of the teeth. Her teeth had been regulated fourteen or fifteen months previously. The superior laterals were shutting inside of the inferior teeth. I was told that they had been made straight and had gone back again. Some filling had been done with amalgam.

The sixth-year teeth were very poor indeed, and on looking the case over I decided deliberately to take out the four sixth-year molars. Some day I will show you the result of the extraction of these molars. Those teeth were extracted in June, and in September I showed her how she could bring out the laterals by biting upon a stick. The spaces are nearer a half than a third closed and are improving constantly. The condition of the mouth is very much improved.

I have another case of a patient with very broad jaws, and somewhat of an overhanging of the central incisors, laterals, and bicuspids of the superior maxilla.

Some time ago a dentist extracted the lower sixth-year molars. The upper teeth were overhanging the lower very much at that time. A year has passed and the trouble has increased. Perhaps the next best thing to do is to take out the upper sixth-year molars.

It seems to me it would have been better to have taken them out in the first place.

I do not indorse all that has been said by Dr. Clowes. He extracts all sixth-year molars. I have seen some shameful and some admirable results in this direction. I am inclined to think the practice more valuable than I used to think it was, but I have found that in a large number of cases the extraction of the bicuspids is all that would be necessary to bring about the condition that Dr. Clowes has spoken of. There are a great many men who do not discriminate.

Dr. Clowes. I said I always extract the sixth-year molars when it is necessary. A man has got to have some judgment. Suppose a patient came to me with the laterals erupted and with no permanent canine; do you suppose I would extract the sixth-year molars under such circumstances? That would be the greatest folly. Extract them always when it is necessary,—that is, almost always.

ALUMNI ASSOCIATION PHILADELPHIA DENTAL COLLEGE.

At the annual meeting of the Alumni Association of the Philadelphia Dental College, held at the college building, 108 North 10th Street, Philadelphia, February 27–28, 1879, the following gentlemen were elected officers for the ensuing year:

President.—Dr. J. Lehman Eisenbrey.

First Vice-President.—Dr. Joseph P. Wyman.

Second Vice-President.—Dr. Frank L. Bassett.

Third Vice-President.—Dr. Filipp Ungar.

Secretary.—Dr. L. Ashley Faught.

Treasurer.—Dr. W. A. Breen.

Executive Committee.—Dr. Daniel Neall McQuillen, *Chairman*, Dr. Alonzo Boice, Dr. Charles H. Davis.

L. Ashley Faught, *Secretary.*

DENTAL DEPARTMENT, UNIVERSITY OF MICHIGAN.

The fourth annual commencement of the Dental College of the University of Michigan was held in the hall of the university, in conjunction with the commencement exercises of the Law and Medical Departments, on Wednesday, March 26, 1879.

The annual address was delivered by ex-Governor Blair.

The degree of D.D.S. was conferred by the president of the university, Dr. J. B. Angell, upon the following graduates:

Name.	Residence.	Name.	Residence.
David M. Cattell	Ohio.	Edwin J. Lilly	Ohio.
William H. Dorrance	Michigan.	Henry B. Orr	Ohio.
Frank O. Gilbert	Michigan.	Howard T. Sackett	Ohio.
Clark L. Gregory	Michigan.	Samuel B. Short	Indiana.
Herbert F. Harvey	Ohio.	E. Frank Sites	Indiana.
George T. Higgins	New York.	Frank H. Waldron	Ohio.
James H. Kennicott	Illinois.	C. L. F. Wall	Ohio.
Frank B. Wells	Michigan.		

ILLINOIS STATE DENTAL SOCIETY.

It has been found necessary for the executive committee of the Illinois State Dental Society to change the place of holding the next meeting from Peoria, the place selected at the last meeting, to Springfield.

The next annual meeting will therefore be held at Springfield, Illinois, the second Tuesday, May 13, 1879, commencing at 10 o'clock.

An urgent appeal is made to the dentists of the State, and a cordial invitation extended to the profession of other States, to meet with us.

By order of the executive committee.

J. N. Crouse.

JOINT CONVENTION OF NEW ENGLAND DENTAL SOCIETIES.

A joint convention of all the Dental Societies in New England will be held in Wesleyan Hall, Bromfield Street, Boston, June 5–6, 1879. A large number of essays will be presented by able men of the profession in New England. A cordial invitation is extended to all interested to be present.

CENTRAL COMMITTEE OF ARRANGEMENTS.

C. H. Osgood, J. H. Kidder, R. R. Andrews, H. C. Merriam, A. M. Dudley, Massachusetts Dental Society; I. Goddard, Maine Dental Society; C. W. Clement, New Hampshire Dental Society; Jas. Lewis, Vermont Dental Society; Geo. L. Parmele, Connecticut Dental Society; W. P. Church, Rhode Island Dental Society; C. A. Brackett, Connecticut Valley Dental Society; L. D. Shepard, Merrimack Valley Dental Association; E. P. Bradbury, American Academy Dental Science; J. H. Batchelder, Boston Society for Dental Improvement.

C. H. Osgood, *Chairman.*

Albion M. Dudley,
Secretary of Committee of Arrangements,
Salem, Mass.

PERISCOPE.

The Rôle of the Salivary Secretion in the Physiology of Digestion.—You are all aware, gentlemen, that the appropriation of a definite amount of nutriment forms one of the essential conditions of life, whether of animal or vegetable, and it has seemed to me that we cannot begin more appropriately a series of demonstrations of physiological facts than by following the changes which that material must undergo, and the means by which these modifications are acccomplished, before it can serve as nutriment.

We will, therefore, commence our experiments by studying successively the various fluids to whose action the material taken as food is subjected,—saliva, gastric juice, bile, and the intestinal fluids,—examining to a limited extent their composition, since this branch belongs more particularly to physiological chemistry, while we will study with more detail the character of their digestive action, the circumstances which modify it, and the influence of the nervous system upon their secretion. We will commence, therefore, with the rôle of the salivary secretion.

The uses of saliva are both mechanical and chemical. Mechanically, it assists in the formation of the bolus of food, after having previously aided its mastication, and acts as a lubricant to its passage into the stomach; it aids the appreciation of taste, and, by lubricating the surfaces of the mouth and teeth, prevents the adhesion of viscid substances and permits the movements of rapid articulation. Its chemical attributes are even more important; these we will examine in detail presently. The saliva is a remittent secretion formed by the three pairs of salivary glands, to which is added the fluids furnished by the lingual and palatine glands, and the numerous follicular glands of the buccal mucous membrane. We will examine first this mixed saliva.

I have here about 30 c.c. of fresh mixed saliva, obtained by expectoration after stimulating its flow by chewing a piece of rubber tubing. You see that it is opalescent, with quite a decided froth on its surface, from the air-bubbles detained through its viscidity, and that there is a marked white precipitate, composed mainly of epithelial cells and salivary corpuscles. (In this other specimen, which has stood for two or three days, a thin pellicle of carbonate of lime has formed.) Its specific gravity is 1.005; its reaction, as shown by the litmus-paper, decidedly alkaline. The instances in which an acid reaction has been found in the fluids of the mouth are due to an increased acidity of the buccal mucus from some pathological cause, such as the fermentation of retained fragments of food, the tartar of the teeth. Saliva is invariably alkaline.

Of its inorganic constituents, I will only call your attention to the sulphocyanide of potassium and the chlorides.

I have here a few c.c. of saliva which has been filtered to remove the epithelial cells and mucus. To a portion of this I add a drop of a solution of perchloride of iron, so dilute as to be almost colorless, and you see, as I stir it, a decided red color is developed, showing the presence of the sulphocyanide. Occasionally the reaction fails, but it can almost always be produced if the saliva is evaporated to about one-third of its bulk. There is probably no other one element of an organic fluid which has caused so much dispute as this salt, whose presence I have just demonstrated. The reaction has been supposed to be due to the presence of nicotin, to the presence of acetates, of decomposed matters from carious teeth, to hydrophobia, etc. This reaction may become important in a medico-legal point of view, since it is identical with that of meconic acid; the two substances can be distinguished, however, in a very simple manner. I will add a few drops of a solution of mercuric chloride to a mixture of the saliva and the perchloride of iron, and the color disappears; no such result would have been obtained had the saliva contained meconic acid. The red color produced by meconic acid and perchloride of iron remains unaltered by the addition of corrosive sublimate. The presence of chlorides may be proved by taking this other portion of the filtered saliva and acidifying it strongly with nitric acid; and now the addition of a few drops of a solution of nitrate of silver causes quite a decided precipitate, which, you observe, dissolves readily in aqua ammonia.

The organic constituents of saliva are albumen, mucin, and ptyalin. The presence of albumen is shown by what is termed the xanthoproteic reaction. To a portion of fresh saliva I add a few drops of strong nitric acid, and you notice that although the mixture becomes slightly turbid, there is no distinct precipitate; upon boiling, it becomes clearer and takes on a faint, yellowish hue. I will let this stand for a few moments until it cools off somewhat before finishing the test. To the presence of mucin is due the tenacity and stickiness of saliva. To another portion of the same saliva I will add gradually a few drops of acetic acid, stirring all the time, and the fluid becomes more and more tenacious, until finally the mucin separates in stringy flakes. The test for albumen has now cooled considerably, so we can proceed with the reaction. You remember I added nitric acid and boiled the fluid, with the production of this yellowish tint as the result. I will now add a little ammonia, and the faint yellow becomes very decidedly marked, almost orange-red, in fact, showing the presence, to a considerable degree, of albuminoids. Ptyalin, or "animal diastase," is the substance on which the property of converting starch into sugar depends. It has been obtained in this instance by extraction from the salivary glands of an ox with glycerin. The gland is finely minced and covered, in a corked flask, with absolute alcohol. In twenty-four hours the alcohol is poured off, and as much as possible driven off from the gland by pressure; the residue is then covered with glycerin and allowed to stand for several days, being stirred occasionally. At the end of this time the whole is strained through muslin, and then filtered, and the ptyalin is precipitated from the filtrate by an excess of alcohol. The precipitate can then be collected by subsidence and decantation, and must be dried at a low temperature, over sulphuric acid. It is soluble in water, and differs entirely in its reaction from albumen. The xanthoproteic reaction cannot be produced, nor is any precipitate produced with acetic acid and potassium ferrocyanide.

We come now to the study of the most important of the attributes of the salivary secretion, viz., its power of converting starch into sugar.

In each of these three test-tubes, which we will number 1, 2, 3, I have placed the same quantity of starch mucilage, made by mixing one grain of powdered starch into a thin paste with a few drops of cold water, and then adding the paste to 100 c.c. of boiling water, and allowing it to boil for ten minutes; then, after standing until the sediment has settled, the clear, supernatant fluid is filtered off and is ready for use. I will now divide this specimen of fresh filtered saliva into two equal parts; one part I add to the test-tube marked 2, and the other, after boiling thoroughly for three or four minutes, I add to 3. Into this fourth test-tube I will put saliva alone. I will put them all, now, for a few minutes, into the water-bath, heated to 38° C. 1, containing starch mucilage alone; 2, containing one part of saliva to three times its bulk of starch mucilage; 3, starch and saliva in the same proportions, the saliva, however, having been boiled, while the fourth test-tube contains saliva alone. While we are waiting until the test-tubes have been subjected for a few minutes to the heat of the water-bath, I will explain to you the mechanism of the bath. . . .

Let us now examine the test-tubes.

In No. 1, which you remember contained starch mucilage alone, the addition of a few drops of iodine solution, so dilute as to be almost colorless, causes the instant appearance of the characteristic *blue color* of the iodide of starch; while, if I add a few drops of Fehling's solution to another portion of the same specimen, adding merely enough to give the fluid a blue tinge and then boil, there follows no decoloration or deposit, showing that the starch employed contains *no sugar.*

To a portion of No. 2, which contained starch mucilage and saliva, I add a few drops of the same solution of iodine, and you see the result is very different; there is no such decided blue as occurred in the first instance, merely a faint tinge of *violet*, from the presence of dextrine. The starch has disappeared. To another portion of the same specimen I now add a few drops of Fehling's solution, and upon boiling there is a copious, yellowish-red precipitate, due to the reduction of the cupric to cuprous oxide, and showing the presence of a considerable quantity of sugar. The sugar has replaced the starch.

With the fluid from No. 3, which contains starch and saliva, which latter, however, you remember was boiled, a few drops of iodine gives still the reaction of starch, while boiling with Fehling's fluid shows no sugar. You will learn from this that boiling destroys the property possessed by saliva of turning starch into sugar. In some instances, when there is an appreciable quantity of proteids in the saliva, the blue of the Fehling's solution is changed to violet.

With the fluid of No. 4, containing merely saliva, there is no reaction to iodine, and the Fehling's solution, when boiled with it, has, I think, more of a violet tint than before.

You have seen, then, that when starch mucilage is subjected to the action of saliva *for a few minutes*, at a temperature of about that of the body, the starch is entirely converted into sugar.

I lay stress upon the condition "for a few minutes," for I want you to appreciate that this conversion is not instantaneous. It was taught by Bidder and Schmidt that momentary contact of the saliva and starch was all that was necessary to turn the starch into sugar, with an experiment which has been long used to substantiate this view, and which appears, at first, to demonstrate its truth, is really by no means conclusive. The experiment is as follows: into this beaker, which contains a little saliva warmed up to 40° C., I will add, drop by drop, a solution of starch which has been colored blue by iodine, and you see, as each drop falls, it is decolorized. It has been supposed that the starch was instantly converted into sugar, breaking, in this manner, the combination of the iodine and starch. That this view, however, is erroneous, was pointed out by Schiff. He showed that the decoloration was due to the conversion by the saliva of the iodine into hydriodic acid, and that many other organic fluids, which would not convert starch into sugar, would decolorize iodide of starch.

I have here a quantity of dog's urine, which you see also decolorizes the iodide of starch; and, if I add a little morphia to another portion of solution of iodide of starch, you see the color disappears. In neither of these substances is there the property of converting starch into sugar, but the result is due to the oxidization of the iodide. There are two practical points to be drawn from this demonstration: first, since the starch is not instantaneously converted into sugar upon contact with the saliva, mastication should be prolonged and thorough, though by no means can all the starch be converted into sugar in the mouth; and, second, that starch cannot be considered as a conclusive test for the presence of iodine in the various secretions. It is often desired to test urine, milk, etc., for iodine, as in cases of iodism, and all that is deemed necessary is to add a solution of starch mucilage to the suspected liquid, and if the characteristic blue color does not appear, it is concluded that no iodine is present. This procedure is doubly fallacious; not only because these very fluids have the power of decolorizing solutions of the iodide of starch, but even when iodine is present, it is not in the form of free iodine, but as hydriodic acid, the very agent through which this decolorization is effected.

Let me anticipate here what I will demonstrate to you directly, viz., that cold saliva has little, if any, action on raw starch, unless in contact for some hours; yet you see that, if I add a little iodine to this mixture of raw starch paste and saliva, no blue coloration is produced, while the iodine will act on raw starch as I now show you. This is another proof that the decolorization was not due to the conversion of starch into sugar.

Continuing our study of the chemical properties of mixed saliva, we have now to examine the influence of temperature, and of acids and alkalies on the diastatic properties of saliva. I have here four test-tubes, into each of which I introduce a little saliva with a pipette. 1 I place in a mixture of salt and ice; 2 in the rack on the table; 3 in the water-bath at 40° C., and the 4th I boil vigorously for a few minutes, and allow it to cool. After they have been reduced to the temperature of their respective media, I add to each a little starch paste, and after waiting a few minutes test each of them for sugar. None is found in 1; a little in 2; more in 3, and none in 4. I now place the remaining portions of 1 and 4 in the water-bath, and after waiting a few minutes test them each again for sugar. Sugar is now found in 1, but none in 4. Therefore you have seen that the power of saliva for converting starch into sugar is more or less suspended at a low temperature, while it is destroyed at a high temperature.

I have shown you that the conversion of starch into sugar is by no means instantaneous, and that even with the most prolonged mastication some unconverted starch is swallowed, and it, therefore, becomes interesting to know whether the acid of the gastric juice will interfere with the process. It is also known that in some pathological cases the reaction of the mouth is acid; is the conversion of starch into sugar thereby prevented?

In these three test-tubes, 1, 2, 3, I have placed equal bulks of starch mucilage and saliva. To 1 I add an equal bulk of distilled water; to 2 an equal bulk of distilled water containing 0.65 per cent. of mercantile muriatic acid, which forms an acid of about 0.2 per cent. of H.Cl., being about the degree of acidity of the gastric juice; to 3 I add the same bulk of 10 per cent. muriatic acid. We will put them each into the water-bath. After allowing them to remain for a few minutes I will test them each for sugar. It is found in 1 and 2, but none in 3. I will now carefully neutralize the acidity of 3 by adding, drop by drop, a weak solution of caustic potash, carefully avoiding excess until this litmus-paper which I have put in the tube gradually becomes pinkish instead of the decided red which it showed before. I will now put it back in the bath, and in a few minutes test again for sugar; and you see it is present in considerable quantity. You will learn from this that although all the starch does not become sugar in the mouth, the acidity of the gastric juice will not interrupt its conversion, and if from any cause either the secretion of the mouth or that of the stomach should become extremely acid, the process will again go on when the excess of acidity has been neutralized by the intestinal fluids, which, you know, are alkaline. It is also well for you to know that the diastatic action of saliva is *destroyed* by the caustic alkalies, not recoverable upon neutralization; but the weaker alkalies, such as lime-water, ammonia, carbonate of soda, etc., merely suspend its power of converting starch into sugar. You have, therefore, in these facts the rationale of the administration of alkalies in cases of excessive acidity either of the mouth or stomach, as in pyrosis, to permit the digestion of amylaceous articles of food, while you also see that in the many cases in which it may be necessary to administer alkalies there is no danger of arresting this function of the saliva, since, when neutralized in the stomach, the process again goes on.

You have seen that saliva converts starch mucilage rapidly into glucose; the action on raw starch, however, is much slower and more complex. It does not transform it directly, but extracts from it a part, which alone is converted into glucose, while the rest remains unaltered.

Those of you who have examined starch granules under the microscope, know that each granule consists of a number of layers, arranged in an eccentric manner around a point called the hilum. These layers consist alternately of two substances, which are termed respectively starch cellulose and starch granulose. The latter alone is colored by iodine, unless the granules have been previously acted on by sulphuric acid or chloride of zinc. Saliva acts only on the granulose, and hence, when raw starch has been subjected for several hours to saliva, the granules are not colored by iodine though they still retain their form. The saliva has extracted part of the starch granules, the granulose, which it has converted into glucose, while it still leaves intact the cellulose. With starch mucilage, made with boiling water, however, the case is different; under these circumstances the starch is totally changed; no residue can be discovered upon microscopic examination. The cellulose has itself been altered by the action of the boiling water, and both the cellulose and granulose are changed into dextrine, and it is the dextrine which is converted into glucose. That the cellulose is really the agent which prevents the action of saliva on raw starch, can be readily proved by removing the cellulose artificially, as by powdering starch granules with fine sand, when the cellular envelope is broken up, and an aqueous solution of the granulose can be readily made, which will be comparatively rapidly acted on by saliva.

That the conversion of starch is due to the presence of ptyalin is proved by the experiment showed to you a few minutes ago, in which you saw that boiling saliva destroyed this property, from which, on the other hand, you would be justified in inferring that ptyalin is what is known as a ferment, and acts "catalytically," a convenient expression of our ignorance.

There is only one other point that I want to call your attention to in reference to the action of mixed saliva on starch, or rather, I should say, in reference to the result of that action; and that is, that sugar dialyses, and starch does not.

Into one of these dialysers, formed by tying a piece of parchment paper over one end of a bell-shaped tube, after having found by testing that they are perfectly tight, I have placed some dilute starch mucilage; in the other, another portion, with some saliva. Both were then suspended in separate vases of water for twenty-four hours. We will now examine them. Upon adding iodine to the fluid around the first there is no evidence of starch, nor upon testing with Fehling's fluid of sugar; while in the fluid around the second there is no starch, but there is decided evidence of sugar. Sugar, therefore, dialyses, but starch does not. All the preceding experiments can be made with an aqueous infusion of the salivary glands of most of the lower animals: *e.g.*, guinea-pigs, oxen, sheep, or rabbits.—*Lecture on Experimental Physiology in the University of Pennsylvania, by Robert Meade Smith, M.D.—Medical and Surgical Reporter.*

TEETHING AS A CAUSE OF CHOLERA INFANTUM.—Teething may be considered as a concomitant cause of cholera infantum, as it is during dentition that it occurs; undoubtedly the one is a great aggravation to the other. To what extent, if at all, dentition may be a cause of this disease, authors seem to take little interest, and appear to think that at this age there is such great functional activity, and rapid development of the intestinal follicles, and a peculiar liability to the disease, as would be a sufficient cause, rather than dentition. It has been, in theory, to me, one of the chief causes of the disease. In teething we have, as one of the first symptoms, an excitement of the buccal and salivary glands of the mouth, stimulating to a constant overflow of their secretions, which, undoubtedly, are somewhat modified, in their being more acid in their constituency from the alkaline qualities being wholly taken up in supplying the demands of the system in advancing the developing of the teeth. This evinces the truth that, in the diarrhœa from teething, the alkaline treatment is the most effective, and also suggests that mothers should give their children aqua calcis when they observe a superabundance of saliva running out of the child's mouth, which I believe would help supply the demands of the system, and avert many attacks of this disease.—*Extract from Paper by Wm. S. Stewart, M.D., in Medical and Surgical Reporter.*

TRANSPLANTATION OF TEETH.—A remarkable experiment in the transplantation of teeth is recorded in the *Gazette des Hôpitaux*, No. 2, 1879. On July 30, M. Pietkiewicz extracted an anomalous right lower lateral incisor, which grew under the tongue in a young woman of twenty-six, and planted it in the upper jaw on the same side, in the alveolus of the lateral incisor, which he had just removed for extensive caries, and which was rotated congenitally on its axis. At the same time, by a special apparatus exercising constant pressure, he was able to bring back the right inferior canine into line. In spite of an accident, six weeks later, the experiment succeeded perfectly, the tooth becoming fixed with great firmness. It has been long known to be possible to replace a tooth just removed by another similar to it in regard to age, volume, form, etc., if recently extracted. Indeed, Professor Alquié of Montpellier showed, in 1858, that a carious tooth could be replanted after resection of its decayed portion. But it is pointed out that, in M. Pietkiewicz's case, there were very remarkable anatomical differences between a lower and upper lateral incisor. The roof of the former is finer, and flattened transversely and grooved; that of the upper is fuller and rounded. In fact, the fang of the lower by no means filled the upper alveolus, while at the same time it was considerably too long for it, requiring removal of a third of the crown to bring the edge into line with its neighbors. In spite of all this, the success was perfect, and suggested to the surgeon mentioned the possibility of utilizing anomalous teeth for transplantation, even to replace others not anatomically analogous to them, the difference in shape being remedied by cutting and shaping with instruments. The teeth of other mammals might also, perhaps, be successfully employed for the same purpose.—*British Medical Journal.*

TRANSPLANTATION AND REPLANTATION OF TEETH.—Transplantation of teeth from one person to another is a subject which has always the privilege of exciting curiosity, as at the present moment; it has indeed a tolerably copious history, ancient and modern. In the days of Rowlandson, the question had become so notorious as to call forth one of his best caricatures. In the museum of the Odontological Society will be found an amusing sketch of the charlatan, who has induced sweeps and beggars to come to his rooms to supply the dental deficiencies of his wealthy clients. The wrinkled belle and padded beau may be seen criticising the handiwork of the quack, while the toothless wretch approaches the door and looks with dubious face at the coin he has received as an equivalent for his lost tooth. There is little question that the practice was known to the ancients; and there is reason to believe that both the Israelites and ancient Egyptians performed the operation. Natural teeth, fastened in by gold wires, have been found among the mummies. Transplantation of the teeth is not only physiologically possible, but was warmly advocated by John Hunter in 1783, and again in 1788. Whether it is, however, justifiable, as more than a very exceptional resort or expedient, is a very different matter. There are the obvious risks of severe inflammatory symptoms supervening; the doubtfulness of the new tooth fitting accurately the old socket; the known impossibility of preserving the vitality of the dental nerve-pulp; and the more than probability of not obtaining perfect vascular union between the socket and the periosteal membrane of the tooth. Added to these sufficiently cogent objections to the operation, we have, it has been pointed out, the rather remote possibility of transplanting the germs of disease with the tooth. There remains the ethical question of maiming one person to beautify another. That it has been the dangerous plaything of quacks and the bait of impostors is probably a matter that we need not here discuss, although it is certainly a point which it would be well should not be forgotten. Replantation of an extracted tooth needs no comment: it is as well established in dental practice, under certain limits, as the resection of bones or excision of joints; and all standard authors, including Wedl, Tomes, and Mitscherlich, justify and advise its performance under a variety of stated conditions. It has been employed rather extensively during the last few years in one of the metropolitan hospitals.—*British Medical Journal.*

THE MEDICAL COUNCIL AND THE PROPOSED DENTAL CURRICULUM.—The dental curriculum of the Royal College of Surgeons of England is the growth of twenty years' experience in the conduct of dental education; and the proportion of less than three-fourths of successful to over one-fourth of unsuccessful candidates for the dental licentiateship may be accepted as a proof that for the present the curriculum is sufficiently extended; in other words, that the allotted time for study is very fully occupied: a condition common to both the medical and dental curricula of the College of Surgeons.

The dental curriculum proposed by the committee, consisting of the representatives on the Council of the several colleges which under the Dentists' Act grant dental qualifications, is in substance that which is in operation in England,—varied, however, *slightly* in the details and in the order of the subjects of study. For instance, not less than one year of general hospital attendance is substituted for two winter sessions of six months each, leaving, as we read it, a choice of two winter or one winter and two summer sessions. Again, not fewer than twenty-four lectures on dental anatomy and physiology are substituted for two courses of twelve lectures each. Not fewer than twenty lectures on dental surgery take the place of two courses of not fewer than twelve lectures each. Not fewer than twelve lectures on mechanical dentistry are substituted for the two courses of twelve lectures each; but the three years of instruction in mechanical dentistry from a registered dentist are retained, and the twelve lectures on metallurgy may be included in the practical chemistry course.

The most important subject of all, that of dental hospital attendance (reduced in the scheme proposed for Ireland to nine months), is fixed at a minimum of two years. And it will be admitted by every one who has been practically engaged in teaching, or who has been himself properly instructed, that the dental student cannot be sufficiently taught in less than two years.

A memorial, praying that the standard of dental education at present in operation should not in any respect be lowered, was, in December last, addressed to the Medical Council, signed by fifty dentists, each of whom is, or has been, engaged in teaching dental surgery; and the prayer has been favorably considered in the proposed minimum curriculum. Without admitting that an improvement has been made by the committee, to find any serious fault with the alterations would be to raise a quarrel for the sake of quarreling. For, be it remembered, the existence of a minimum curriculum in no way hinders any particular college from maintaining a somewhat higher standard. The object sought is to prevent the adoption of a lower standard of education than the one specified by the presiding authority, while freedom is given in the arrangement of the details of education. Further interference than this with the educating bodies would not be advantageous or justifiable.—*British Medical Journal.*

ROYAL COLLEGE OF SURGEONS IN IRELAND.—In this department of the December number of the DENTAL COSMOS we published an item concerning the examinations for the dental diploma of the Royal College of Surgeons in Ireland, in which it was stated that four gentlemen who held the American degree of D.D.S. were among the successful candidates. We learn that in addition to the four whose names were given, two others, Drs. Wedgewood and Sigismund, both graduates of the New York College of Dentistry, were also successful in obtaining the degree of the Royal College.—EDITOR DENTAL COSMOS.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Is a licentiate of the "Royal College of Dental Surgeons" of Ontario, Canada, entitled to practice dentistry under the laws of Pennsylvania?—D. D. S.

REPLY TO A. B. P., in April number of DENTAL COSMOS.—Metals, like all other elementary substances, tend to form definite chemical compounds when alloyed with each other.

Though these metallic combinations doubtless take place according to the law of quantivalence, which governs all combinations of elements, distinct proof of this in the case of many metals is wanting; amalgams are nothing more than alloys of other metallic elements with mercury. When mercury is added to the amalgam alloy in proper proportions a chemical compound more or less crystalline is formed, which hardens in the course of a short time. Now, if this mercurial compound is pulverized by heat or otherwise and more mercury is added it will fail to harden again, simply because an alloy is formed, which is not a chemical compound, but a solution in an excess of mercury of the chemical compound formed when mercury was first added to the amalgam alloy.—EDWARD C. KIRK.

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ORIGINAL COMMUNICATIONS.

REPLANTING, AND A NEW PROCESS OF INGRAFTING PORCELAIN CROWNS ON NATURAL ROOTS.

BY GEORGE W. WELD, D.D.S.

(Read before the First District Dental Society of New York.)

I PURPOSE this evening to direct your attention to a new process of ingrafting porcelain crowns upon the roots of natural teeth. I am well aware of the natural repugnance to receiving, much less adopting, new ideas and processes that demand decided changes in the principles of practice.

As an exponent of a method so intensely radical in operation, and yet so conservative in results, I invite your criticisms, if based on careful observation. Though the subject may be imperfectly presented, the effort will be to consider it from a purely scientific standpoint.

Briefly stated, the process is as follows: the root of a tooth, with or without a partial crown, is first *extracted*, the decayed portion cut squarely off with a corundum wheel, or saw, just at the lingual and labial points of enamel that extend towards the apex of the root, and in all cases, where no absorption of the *alveolus* has taken place, directly under the margin of the gum. A porcelain crown (Fig. 1), with a tapering screw made of platinum and iridium, which had been securely *baked* in the center perfectly parallel with its length, is then firmly screwed into the pulp-canal of the root, the nerve having first been removed and the canal enlarged by reaming out with an engine-reamer (Fig. 2). To facilitate the introduction of the screw, a preparatory thread is cut in the root with a tap (Fig. 3). This process establishes a very strong attachment between the natural root and the porcelain crown, and with the additional aid of cement in the canal, it is made perfect. When this operation is completed (which requires from fifteen to twenty minutes) the socket is syringed out with tepid water, and the root with the new crown attached is gently but firmly pressed into its original position. Perfect re-attachment ensues in from two to four weeks.

There is seldom any pain in replanting a tooth, and as nitrous oxide gas is usually administered for extraction, the whole operation is almost painless. The inflammation is never as great, and the inconvenience to the patient from soreness of gum is in almost every instance very much less when the root is replanted than when the wound is allowed to heal in the usual manner.

Fig. 1.

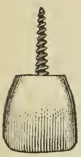


Fig. 2.

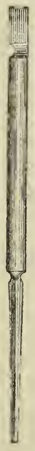
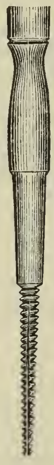


Fig. 3.



It is obvious that the method just described presupposes, among other essentials of success, the re-establishment of a pericemental connection between the cementum of the root and the pericementum.* The sole object of extraction is to secure by mechanical means a more perfect and less expensive attachment than can be obtained while the root is in the mouth. That ordinary pivoting of teeth fails as a permanent operation can be attributed only to imperfect and insecure attachments. The loss of pivoted roots is the result of the constant motion caused by the imperfect attachment of the crowns.

Your attention is invited to a consideration of the following points in connection with this method of pivoting:

1. The necessity of extraction to secure perfect and inexpensive attachment between crown and root considered in relation to the advantage gained from the use of the screw as a mechanical agent.
2. The function of the pericementum and its reparative power.
3. The permanent success of replanting considered in relation to systemic complications and the liability to future pericementitis.
4. The cementum: its ability to resist caries considered in relation to its vital power and that of the pericementum.
5. Cheapness and beauty of the operation.

The importance of the screw as a mechanical agent in joining two or more things into one is self-evident. There is no necessity, therefore, of elaboration on this point to convince you that its application after extraction renders an attachment between crown and root absolutely perfect, and the operation simple and inexpensive.

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* Pericementum is used instead of periosteum, as being more specific.—G. W. W.

The function of the pericementum or fibrous connective tissue of the alveolus is of triple character: first, it retains the tooth in the socket by firmly investing the cementum, or external parts of the root; secondly, it preserves the integrity of the cementum by nourishment; and, thirdly, it serves as a cushion; so that a tooth firmly imbedded in the socket, and surrounded by a healthy pericementum that seems apparently immovable, is, nevertheless, susceptible to a slight mechanical change or movement whenever the teeth are closed together or pressure is applied. It has been noticed that a tooth having no antagonizing tooth or opposing obstacle will generally elongate; consequently it would seem that the action of a force directed against the crown and root, such as comes from mastication, is an important requisite in preserving the pericementum in a normal condition. Of the reparative power of the pericementum little that is definite is known. We are informed that it is a highly vascular but "lazy" tissue.

But vascular tissue signifies life, action, and recuperation; lazy tissue just the reverse. It has been remarked by Druitt* that "a precise pathology requires us to separate repair (a process beneficial, gentle, and painless) from inflammation (a process injurious, violent, and painful). True it is that both repair and inflammation have the one feature, exudation, in common; and that exudation induced by inflammation may, after inflammation has ceased, serve the purpose of repair."

Thus while it is important to keep the pericementum of the extracted root free from unnecessary irritation, it is none the less true that the greatest danger to successful and permanent repair comes from another source. The success of replanting in the past serves as no criterion for the present, for the art has not generally been practiced under conditions the most favorable to proper repair.

Teeth have been replanted containing the dead pulp and nerve with a belief that not only would the root re-attach itself to the pericementum, but that the nerve and blood-vessels in the canal would reunite with the nerve and blood-vessels severed by extraction.† I think I am justified in saying that the severed nerve and blood-vessels of an extracted root never remain alive, much less reunite. The death of the pulp and nerve invariably follows extraction, and if allowed to remain in the root they become putrescent, degenerating into a putrid mass of such poisonous and irritating properties that even an infinitesimal quantity could hardly fail to retard, if not prevent, the repair of any tissue. Again, to facilitate a thorough filling of the canal and pulp-chamber, an opening has been made from the apex of the root only; but this method necessitates the loss of the most important part of the root,—that part composed exclusively of cementum,—the portion which, more than any other, possesses a *vital relation* to the pericementum of the utmost importance.

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* Druitt's System of Modern Surgery, 1867.

† There may be a few exceptions, where, in replanting dislocated teeth in children's mouths, the nerve of an extracted root has reunited and afterward been found to be alive. Such cases, however, are exceedingly rare.

The living corpuscles in the cementum never extend to the cervical portion of the root, but are distributed from the middle of the root to the apical foramen.

To cut off the end of a root and expect permanent repair would seem to be an assumption unsupported by any principles of surgery. The writer has never observed a condition of things which warranted him *in believing that there is ever pericemental* ossification either in replanting* or transplanting.† But that the pericementum is endowed with reparative power of high degree, and the certainty of successful re-attachment to the cementum assured beyond all doubt, is a conclusion based on what has been accomplished even under unfavorable conditions. Consider its helpless position; the irritation it constantly receives during convalescence from the act of mastication; and then the results.

A case of repair of a central incisor root with porcelain crown attached now presents itself. The operation was performed in October, 1878, for a young man thirty years of age. From a peculiar position of the adjacent teeth the usual silk ligature was abandoned after the first day. I had but little hopes of saving this tooth, as the patient had no antagonizing molars or bicuspids, so that the front teeth—especially the new one—were compelled to do double duty. A few days after the operation the patient—who, at the time of the operation, was in ill health—started on a trip to Virginia, and while there his only child sickened and died. Tired and sick in body and worried in mind, he returned to New York in an anæmic condition and told me of his grief. But, to my great surprise, he informed me that the tooth which I had replanted less than two months previous was as firm as any tooth in his mouth. He said that he had experienced no inconvenience from it after the third day, and for the first three days nothing worth mentioning. He has now a tooth which for permanency and usefulness, cheapness and beauty, cannot be excelled.

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* The writer is now engaged in a series of experiments by which he hopes to determine the exact physiological conditions of pericemental repair.

† It is presumed that a tooth which *elongates* in the absence of an occluding tooth is the result of an increased development of successive layers of cells in the pericementum. This may in some measure account for the reported successes in *transplantation.*

The replacing of a tooth in the socket, so far as the writer has observed, never produces chronic inflammation. On the contrary, whatever inflammation results usually subsides in forty-eight hours, and the process seems to terminate in new formations and the organization of fibrillated tissue.

We come now to the point of considering the permanent success of replanting in relation to systemic complications and the liability of future pericementitis. It is generally admitted, I believe, that the dentine of both crown and root, as well as the enamel, depend chiefly for their vitality on the pulp and the blood-vessels in the canal of the root, and that the cementum is nourished externally from the pericementum. Thus it is that when a tooth becomes pulpless, the dentine, deprived of nourishment, very soon becomes dead in apposition with living cementum, and the pericementum is forced to do double duty. Prof. J. Foster Flagg, in an article published in the DENTAL COSMOS for December, 1878, says that "the work of maintaining this unnatural connection devolves upon the peridentium. It is thus that *double duty* is entailed upon this membrane, and the functional activity which is then developed naturally places it in the same category with all overworked organs or tissues. If the vocal power is overworked, if it is forced to do double duty, laryngitis is the result. . . . If the sight is taxed until it is made to do double duty sympathetic inflammation is developed, and ophthalmia of varied grade soon establishes a condition which entails the habit of recurrence with every trifling irritation. By the same law of vitality an inevitable and irremediable condition of overwork devolves upon the peridentium of such teeth as have lost their pulps."

The pericementum which surrounds a pulpless tooth is susceptible, however, to irritation and inflammation just in proportion to the amount of dead tissue left in the root and dead dentine in apposition with living cementum, or just in proportion to the degree of overwork this membrane is called upon to perform. And if it is true that pulpless teeth doing normal duty last for a less period of time than those with pulps, the cause is attributable to local rather than systemic complication. The extirpation of nerve and blood-vessels, and a thorough cleansing of the canal from pulp-chamber to apical foramen, is not all that is required to insure the pericementum from future irritation, although it may suffice for a time to prevent inflammation. There is still left in the canal an unnatural connection of dead dentine (too often in a putrid condition) with living cementum,—a mass of basis-substance and dentinal canaliculi (and within each canaliculus a dead dentinal fiber) continuous with living cement-corpuscles.

This dead dentine, in the natural order of things, if not already impregnated by a poisonous fluid from a putrescent pulp, is still capable of absorbing fluids, and proving a cause of irritation just in proportion to the susceptibility of the pericementum and the systemic weakness. I wish to urge the position that the nerves and blood-vessels in the canal of a root have but little, if anything, to do with the retention of a normal tooth in the socket; that is the function of the pericementum. Thus it is that when the dead tissues in the root are removed to an extent which prevents any possible injury to the pericementum, the existence of nerves and blood-vessels is no longer a necessity. The retrogressive change, therefore, in the pericementum surrounding such teeth as have lost their pulps, and the premature loss of the teeth, may be attributed to infection from the dead dentine continuous with living cementum.

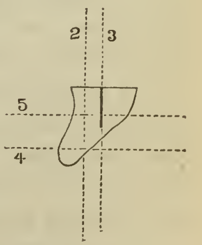
We come now to consider the cementum; its capability of resisting decay, and its vital relation to the pericementum. After a very careful examination of nearly two thousand carious teeth, I am convinced that the cementum rarely decays. I have in my cabinet over a hundred specimens with crowns partially or completely destroyed, but in all cases the carious action ceased at the line of the cementum. True it is that under the microscope there can be seen a certain degree of decalcification of the cementum, but it is superficial. The great mass of the cement-corpuscles remain unchanged, and the inflammatory elements, so far as I have observed, never cross the line of cement-corpuscles, although from the influence of dentinal decay a few of them become enlarged and inflamed. The truth of the statement that the cementum does not decay to any extent is illustrated by the great number of roots which frequently remain in the socket for many years after the entire dentine of *both crown and root* has been completely destroyed by caries. It would appear from this that the cementum of a tooth possesses an innate power of resisting inflammation and the influence of decay as great if not greater than any tissue of the human body.

Dr. C. W. F. Bödecker, in his recent microscopical researches on "the distribution of living matter in human dentine, cement, and enamel," says of the cementum (see DENTAL COSMOS, December, 1878), "No essential difference is noticeable between the lacunæ and canaliculi of ordinary bone and those of the cementum; in both tissues there exists a great variety as to the general arrangement, the size of the lacunæ, the number and ramifications of their offshoots. . . . ' Each lacuna contains a protoplasmic body with a central nucleus,—the cement-corpuscle. The nucleus sometimes is relatively large, and surrounded only by a narrow seam of protoplasm. . . . The net-like structure of both the nuclei and the protoplasm is plainly visible on all cement-corpuscles. . . . On the line of the connection with the periosteum the network of the protoplasm is usually very broad, and the fields of the basis-substance show a prevailing globular appearance. . . . Between the calcified cementum and the striated connective tissue of the periosteum there often exists a narrow zone, occupied by closely-packed spindle-shaped protoplasmic bodies only. In the periosteum itself there are less numerous partly nucleated protoplasmic bodies, between which the fields of an apparently homogeneous glue-giving basis-substance are seen."

If, then, the cementum has the power to resist decay, if the microscopical examinations of chromic acid specimens admit of no doubt as to the existence of living protoplasmic bodies in the cementum, can there be any reasonable doubt of the VITAL RELATION which it sustains to the pericementum when replaced after extraction? In proportion, therefore, as there exists this vital relation and this living matter in the cementum is the general doctrine of repair established. On the other hand, in the degree of living matter in the dentine deriving its nourishment from the pulp and blood-vessels in the canal, but becoming dead matter when its source of sustenance is removed, is the certainty of its becoming a cause of irritation to the pericementum, and a still greater certainty of double duty being entailed on that membrane.

The vantage-ground which the writer claims, therefore, for this method of replanting considered in relation to permanent repair, is in the increased facility obtained by removing every particle of dead tissue in the canal without destroying the end,—the *most important part of the root;* thus getting rid also of an *infectious element*, viz., a part of the dead dentine continuous with living cementum, and decreasing very much the chances of future pericemental irritation, or entailing *double duty* on the pericementum. If it be urged that the writer has taken negative grounds in support of permanent repair, it cannot be said that his reasons for believing in re-establishing a pericemental connection are negative. His successes are too numerous, his experience too well fortified with proof, to justify such a conclusion. Out of *thirty-two* cases the writer can record but two failures. The first was a bicuspid with two roots, the bifurcation commencing about midway between the cervical portion and the apex of the root. The second failure was with a first superior bicuspid root with an angle in its center. (See Fig. 4.) The masticating force in this case was directed almost entirely against the lingual wall of the socket, which caused inflam-

FIG. 4.



2. Proper axis.
3. Axis obtained.
4. Proper base of root.
5. Base obtained.

mation and the loss of the tooth. In the first failure the bifurcation was a contingency for which I was unprepared; and the operation, although a failure, was not a failure in replanting. In the second case it will be observed that the axis of the root did not coincide with the axis of the crown, and it was imperfectly ligatured. I feel confident, with my present experience in replanting, that failure would not again occur under the same conditions.

An eminent dentist of Paris, Magitot, who has recently been experimenting in replanting, has reported to the Academy of Sciences that out of sixty-two cases fifty-eight were successful. From my own experiments, it will be observed that this art, even in its infancy, and necessarily imperfectly practiced, results in only three and one-fifth per cent. loss. As to the permanency of repair, the writer has positive knowledge in one case at least. He is assured by one of his patients, now residing in New York, that she had the misfortune about the year 1838 to receive a severe fall on the face, which resulted in the dislocation and complete separation of the superior central incisors from their sockets. These teeth were replaced by the parent, a few minutes after the accident, and in a short time they firmly re-attached themselves to the socket. I had occasion to fill one of these teeth about five years ago, and found the pulp completely ossified. The appearance of the teeth was normal. For forty-one years these teeth have remained in her mouth free from all irritation, —a living proof of the practicability and permanency of replanting.

This method is advisable on account of its beauty and neatness,—the porcelain crowns excelling in appearance any other artificial teeth the writer has ever seen; being made to correspond in size and shape with the natural teeth. This method also commends itself because the operation requires but little time and is not expensive to the patient. The great majority of mankind afflicted with decayed teeth cannot pay from twenty-five to fifty dollars for golden crown or golden pivot teeth, especially if they can obtain something superior at one-fifth of the cost.

It is a lamentable fact that countless roots are extracted and lost each year which, by this method, could be made permanently useful. Let the people who suffer extraction once know that the root of a tooth, after the natural crown is partially or wholly decayed, is valuable to them and can be preserved, and a beautiful crown attached at little expense, and the wearing of artificial plates will, in many cases, be no longer a necessity.

CELSUS.

Roma. Ob. circ. A.D. 38.

BY E. W. FOSTER, M.D., BOSTON.

(Concluded from page 241.)

III.

PRÆFATIO.

THE first article of these three related to Celsus himself, and the state of general medicine before his time. The second comprised a translation of all he had written, directly or indirectly, concerning the teeth. While this, the third and last article, may properly conclude the series by a few selections from the general practice, translated out of the body of his work; to which are added certain fine sayings of his.

By this much, though necessarily brief, one may at least get a glimpse of the character of medical practice as it flourished at the best hands in the Augustan days of Rome. And, on the whole, from all he has written of medicine, and for the excellent judgment, common sense, and learning that appear on every page of Celsus, it is imperative that one believes his practice to have been as uniformly successful as that of the majority of physicians in our own time. His descriptions and methods of surgery, though they relate to many ages before ether or chloroform and other more modern gifts appeared, are yet in the main strikingly similar to the general modes practiced even to-day. Then, before the boon of anæsthetics, the surgeon had to unite celerity with skill, for if he would save his patient in a capital operation his knife must be swift and unerring, lest the multitude in case of the patient's death should charge it upon the surgeon,—and there was no appeal. In another place Celsus advises the surgeon not to attempt extremely critical cases for this reason alone. Yet a very few even in those times, and against such a popular barrier of ignorance, attained, like Celsus, a distinguished eminence in their profession, as certain of their contemporaries affirm.

CELSIANA, OR SELECTIONS FROM CELSUS (TRANSLATIONS).

Speaking of the cause of disease, Celsus says, "For in relation to the cause of health and disease, or in what manner the air and food are conveyed and distributed, the philosophers themselves neither comprehended a wise knowledge thereof, but followed after probable conjectures. Now, there being no certain knowledge of a thing, simply an opinion about it is not able to discover a sure remedy; and nothing, therefore, is more pertinent to a rational method of cure than experience.

"Although many things may be introduced into the study of arts which strictly do not belong to the arts themselves, yet they improve them by quickening the genius of the artist. Therefore the contemplation of the things of nature, though it does not make one a physician, yet may make him fitter for the practice of medicine. Indeed, it is very likely that both Hippocrates and Erasistratus, and all others not content alone to treat fevers and ulcers, but who inquired to some extent into the nature of things, though they did not become physicians by such, yet truly were greater physicians by so doing. In fact, medicine requires the aid of reason, if not always among obscure causes, or the natural actions, yet often; for the art is conjectural, and not only conjecture in many cases but even experience does not give answer. And sometimes neither fever, nor appetite, nor sleep follow in their regular courses.

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"Besides, there are different properties of distempers in the same person, and one in whom a cure is sometimes unsuccessful, is often restored by a contrary course. Also there are many distinctions to be observed in giving food, from which I shall be content to name one instance only. Hunger is borne more easily by a young man than by a young boy; better in thick, than in clear air; and more easily in winter than in summer; with more ease when accustomed to fasting than otherwise; more easily by the man who is sedentary, than by one who exercises.

"A change of labor also relieves fatigue; and when one is tired of a new kind of labor, that which he is accustomed to perform refreshes him. It is a very good plan for one fatigued to lie down on a couch, if it has been his daily custom; on the contrary, it wearies one not used to it. For that which is contrary to custom is hurtful, be it indulgence or severity.

". . . But above all things we should know the constitution of the body; because some are slender, others fat; some are hot, others cold; some are moist, others dry; some are bound, others lax. It is a rare instance that men do not have a weakness in some part or other of the body. . . . I admit, then, that vomits should not be taken to promote a luxurious appetite, but that they are sometimes useful I believe from experience; yet I would recommend those who would be healthy and live to old age not to make daily use of them."

Again, concerning prognostics Celsus says, ". . . Also, the following are indications of death: pale nails and fingers, a cold breath; or, if one is with a fever or acute disease, or insanity, or peripneumony, or pain in the head, he picks the wool off the clothes with his hands, or fumbles at the edges, or catches at small prominences on the wall close by. Pains, also, which, commenced about the hips and lower parts, are suddenly transferred to the viscera, are signs showing death to be near, and more especially if any of the other signs are concomitant. . . . I am well aware that I may be asked how it happens, if the future signs of death are certain, that some, given up by physicians, should recover, and some are said to have come to life when they were carried out to burial; yet Democritus, justly a great name, declared that the signs even that life was at an end, which the physicians credited, were not infallible; so that he would not allow that there were any positively sure signs of future death.

"I shall not insist on a denial of this, but that some marks, which have great resemblance, not often deceive the able, but the unskillful physician,—which Asclepiades knowing, once cried out, when he met a funeral procession, that he whom they were about to bury was alive!—neither is the art to be blamed on account of its professors. But I will reply, with more moderation, that medicine is a conjectural art, and the reasons for conjecture are such that, although they answer for the general part, yet sometimes fail. And if a sign may deceive perhaps one of a thousand cases, it should not be denied credit, since it answers in innumerable others. And this I say not only with regard to the mortal, but to the salutary symptoms; for hope also is sometimes disappointed, and he dies whom at first the physician held secure. And those things which are required of medicine sometimes turn out for the worse, and it is not possible to escape this in so great a variety of human bodies. But medicine deserves credit, however, which is of service generally in the greater number of the sick; nevertheless, it is proper not to be ignorant that the signs of recovery or death are more deceptive in acute diseases."

Celsus disproves the claim of Asclepiades as being the inventor of the use of friction in disease, and replies, "Now, as it is not proper to defraud the moderns of what they have discovered or correctly imitated, so also we should ascribe those things which were established among the ancients to their authors. It is not to be doubted that Asclepiades has been both fuller and clearer as to when and how friction ought to be used, but he has discovered nothing which our most ancient author, Hippocrates, has not comprehended in a few words, who said, 'With friction: if violent, it hardens the body; if gentle, softens it; if considerable, extenuates it; if moderately used, it increases the bulk.' It follows, therefore, that it may be made use of when a lax body should be restrained, or to soften one that is indurated, or dissipate one where fullness is injurious, or to nourish that which is slender or infirm. Nevertheless, if one examines curiously into the different species of friction (which is not here a matter for the physician), he will easily see that they all proceed from the same cause,—that is, the taking away of something.

"There is another thing of which we should not be ignorant,—that the same remedies are not compatible with all patients. From which it follows that some of the greatest authors praise one remedy and some another, as if theirs was the only one, according as they have succeeded with themselves. It is best, therefore, when a remedy does not answer, to pay not so much regard for the author as for the patient, and to try one thing after another. But in acute diseases, what does not relieve must be quickly changed; in chronic diseases, which time both causes and resolves, whatever has not quickly done service should not be immediately condemned; so also that which gives small relief should not be discontinued, because it takes time to perfect it. . . . Indeed, the method of cure is not new to use contrary medicines by which some recover patients that held out a long time under other more cautious physicians.

"For even among the ancients, before Herophilus and Erasistratus, but after Hippocrates, there was one Petro, who, when he was called to a man in a fever, laid on a great many clothes, that he might at once excite great heat and thirst. And then, when the fever began to remit a little, he gave cold water to drink, and if it caused a sweat, he declared the patient to be out of danger. If he did not obtain a sweat he then gave more cold water, and urged him to vomit. If by either method he relieved him of the fever, he immediately gave roast pork and wine. If it did not succumb to these methods, he boiled water with salt and made him drink it, that by vomiting he might cleanse his stomach. And these things were all he practiced. Which was no less acceptable to those whom the successors of Hippocrates had not cured than it is to those in this age, whom the followers of Herophilus and Erasistratus had long treated without success. . . . But since the same thing cannot agree with all, those who are not restored by a reasonable method are often relieved by rashness; therefore, for this reason, physicians of that class treat the patients of another better than their own. . . . And many things are properly done in the case of imminent danger that ought not to be practiced on any other occasion.

"Now, above all things, a physician should know an incurable case, what is difficult and what more easy. For it is the part of a prudent man, first, not to undertake a case that cannot be helped, lest he should seem to have killed him whom his own fate destroyed.

"Then, again, in a case of great danger, but not yet desperate, he should make known to the friends that the case is difficult, in order that if the disease conquers the art he may not seem to have been ignorant or to have practiced deception. But as this is the part of a prudent man, so, on the other hand, it is the part of a quack to exaggerate a little matter, that he may seem to have performed the greater cure. When the case is easy, it is reasonable that the physician, by a confession of its easiness, be thus obliged to the greater care and circumspection lest that which is of little account may not become greater by negligence.

"*Incurable Wounds.*—One cannot be saved in whom the base of the brain, or the heart, the œsophagus, the portæ of the liver, or the spinal marrow is wounded; or where the middle of the lungs, or the jejunum, the small intestine, stomach, or kidneys are wounded; or where the great veins and arteries of the neck are cut through."

Celsus opposed the popular superstition of his time, that a people called the Psylii had any peculiar charm to remove the poison from a snake-bite wound with their mouths, for he speaks thus: "Nor, indeed, have those who are called Psylii, any peculiar skill, save what custom itself has confirmed. For the venom of a serpent, as well as those which hunters make use of in Gaul chiefly, is not poisonous by the mouth, but by a wound. For this reason the snake itself is safely eaten,—the bite kills. And when it is stupid,—which jugglers can produce by certain drugs,—if one put his finger in its mouth, and is not bitten, there is no danger from its saliva. Therefore, any person, like the Psylii, that shall suck the wound, will save himself and save the patient."

Celsus crosses swords also with Hippocrates: "Indeed, Hippocrates, the most ancient author in our memory, has observed in his works that the eyes are cured by bleeding, by medicine, the bath, by fomentations, and by wine; but he has not explained the proper times or reason for their use, in which the main part of medicine consists."

The following curious paragraph relates to external injuries of the eyes: ". . . There is nothing more desirable for this than to anoint them with the blood of a pigeon, ring-dove, or swallow. Nor is this without cause, since the sight of these birds being hurt by accident is soon restored, and that of the swallow the soonest; which gave rise to the old fable that the parent birds wrought the cure by an herb, which in fact was a force of nature. Therefore the blood of these birds is a very proper remedy for our eyes in external injuries, in this order: that of the swallow is the best, then that of the ring-dove; that of the pigeon is least in efficacy to itself and to us."

Concerning surgery, from preface to Book VII., which runs as follows: "That which cures by the hand," says Celsus, "is the third part of medicine; it is both generally known and has already been observed." (See Part I.) "This, indeed, does not omit medicines and a rational diet, yet it is essentially accomplished by the hand, and the effect of this is the most apparent of all parts of medicine. For, inasmuch as fortune contributes much to the cure of diseases, and the same remedies are often salutary, often useless, it may be doubted whether the recovery is accomplished by the medicine or the constitution. In those diseases, also, in which we mostly use medicine, although success is quite evident, yet it is manifest that health is sought for vainly by these means and is often restored without them.

"And so with regard to the eyes, it may be observed, which after having suffered a long time at the hands of the physician, sometimes recover without him. But in this part which comes by the hand, though it is evident that success may be somewhat promoted by medicines, yet it is mostly to be ascribed to this. But this branch, though it is the most ancient, has yet been exalted more by Hippocrates, the father of all medicine,* than those who preceded him.

"Afterwards, separated from the other parts of medicine, it began to have its professors, and received considerable advancement in Egypt and elsewhere, principally from the author Philoxemus, who has treated this part with the most diligence, in many volumes. Georgias also, and Sostratus, and Heron, and the two Apollonii, and Ammonius Alexandrinus, and many other celebrated men have each made discoveries. And at Rome also are professors of no little reputation, and especially of late,—Tryphon, the father, and Euelpistus the son of Meges; and Meges, the most erudite of all, as appears from his writings, by changing some things for the better, has added considerable to this art.

"A surgeon ought to be young, or at most but middle-aged, with a strong and steady hand, without trembling, and be not the less dexterous with the left than with the right hand. To have a clear sight, intrepid courage, so that he may so far be void of pity for those he has undertaken to cure; and not in compassion to his cries either make haste more than the case requires, or cut less than he ought, but do all things just as if he were not moved by the shrieks of the patient."†

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* From this it appears, that Celsus was the author of this phrase, now so common, that ascribes the paternity of medicine to Hippocrates.

† Very few even of the surgeons of these old days had the courage requisite for capital operations. Then, indeed, did it require the heroism of a Roman, both for the patient and operator; when, as we read, the former was strapped down to a bench with strong thongs of ox-hide, or held there by strong men, and these in turn guarded by others, whose duty was to watch the former that they did

A specimen of ancient anatomy is Celsus's description of the eye:

"The eye, then, has two external coats; each, in that part which is white, is considerably thick; the place before the pupil is thinner. The interior one is joined to this in the middle part where the pupil is, and is concave, with a small foramen; around the pupil it is thin; farther off it is somewhat thicker, and by the Greeks called *choriodes.* As these two coats surround the interior of the eye, they join behind it, and becoming thinner and uniting together into one coat, pass through the foramen which lies between the bones to the membrane of the brain, and are fastened to it.

"Under these, in that part where the pupil is, there is a vacant space; then again below is an exceedingly fine coat, which Herophilus called *arachnoides.* The middle part of this subsides, and in the cavity thus formed is something which, from its resemblance to glass, the Greeks call *hyaloides.* And this is neither liquid nor dry, but, as it were, a concrete humor, from the color of which the pupil is either black or gray, albeit the external coat is white. This is enveloped in a little membrane that proceeds from the interior part of the eye. Under this is a drop of humor, like the white of an egg, from which the faculty of vision proceeds. By the Greeks it is called *chrystalloides.*"

Operation for cataract: ". . . An eye is not fit to be operated upon that is very small, or hollow, and, indeed, there should be a certain maturity of the cataract itself. Therefore we should wait till it is no longer fluid, but observe it to be concreted with hardness. But before the operation little food should be used and water drank for three days; the day preceding the operation take nothing. After this the man must be set in a light place, in a seat turned towards the light, and the physician must sit opposite on a seat a little higher. An assistant should lay hold of the head from behind the part which is operated upon that it may be immovable, for the sight may be forever lost by a slight motion. Moreover, the eye itself which is to be cured must be made more immovable by laying and tying wool over the other. The operation on the left eye must be performed by the right hand, and that of the right by the left hand. Then a needle, very sharp but indeed not too slender, must be thrust in but straight through the two principal coats, in the middle part between the black of the eye and outer angle opposite the middle of the cataract,

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not give way. The description that Celsus elsewhere gives of the management of the patient during the then fearful operation of lithotomy is something terrible to think of; but how much more terrible it must have been for those who had to witness it, and what surprising nerve and skill the surgeon must have had to operate under such conditions! In our days of anæsthetics we can have no just conception of what it was to be a surgeon in those days.

care being taken not to injure a vein. Neither should the needle be thrust in with timidity, because it comes into a vacant space. One of very moderate skill will be able to know when it comes there, for there will be no resistance. When, however, it is arrived there the needle must be inclined upon the cataract, and gently moved up and down, then little by little bring it down below the region of the pupil; when it has passed the pupil it must be strongly pressed down, that it may remain fixed in the lower part. If it remains there the operation is completed. If it rises again it must be cut still more with the same needle into several pieces, which being single are more easily lodged, and therefore give less obstruction.

"After this the needle must be brought out direct, and the white of an egg spread upon wool must be laid on and above that,—something that shall prevent inflammation,—and then the eye is bandaged. The work after this is rest, abstinence, mild unctuous medicines, and food —which is well enough to give the day after—at first liquid, lest there should be too much labor of the jaws; then, when the inflammation is subsided, such as was before directed in wounds. To which it is very necessary to add that the drink be water for a considerable time."

Of the tongue: "The tongue is, indeed, in some persons joined to the part below it from the day of birth, who by this are not able to speak. The end of the tongue must be taken hold of with a vulsella, and the membrane below it cut; great care should be had not to wound the neighboring veins, and the patient suffer from effusion of blood. The remaining cure of the wound is the same as directed in preceding cases, and as soon as it is healed they generally speak. But I have known a case where, after the tongue was cut, though the person could thrust it well enough beyond his teeth, the faculty of speaking did not follow. Thus it is in Medicine; that which is always right to do is not always attended with success."

Concerning fractures of the skull, and the chance of mistaking the sutures for such, Celsus pays this handsome tribute to Hippocrates: "Hippocrates has written that he himself was deceived by the sutures. This is the custom of great men, who have a proper conception of their own superior talents, for little minds who have nothing to begin with, never detract from themselves. An honest confession of error is worthy a great genius, who will have enough left besides, and it is especially praiseworthy in an art which is handed down to posterity for their benefit that they may not be deceived in the same way another was before them. A regard for the memory of a teacher, in other things so great, compelled me to make this digression."

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., BROOKLYN, N. Y.

(Continued from page 209.)

X.

By the use of Strings and Wire.

Illustrative of the application of the screw and string method of moving teeth on the positive principle of action, the following case is given, showing how varied and important motions may be attained thereby. It is typical of a class of cases of arrested eruption of the cuspids late in life, a condition of things which, although at first seemingly almost insurmountable, may, by a properly constructed and applied apparatus, be easily overcome.

Fig. 51.

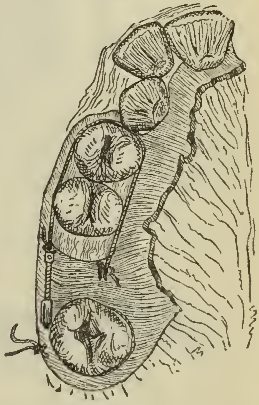

Fig. 51 represents the right upper cuspid tooth, about one-third erupted, standing in the left posterior position, and having forced the lateral incisor into the left or mesial anterior position,* while the two bicuspids are in the left position, and encroach upon the territory properly belonging to the cuspid. The first and second molar teeth are missing, leaving the wisdom-tooth standing alone. The desired movement is to make room for the cuspid and lateral incisor by forcing these bicuspids back; but the difficulty lies in gaining sufficient firmness of anchorage for the attachment of the fixture. Standing alone, the wisdom-tooth is inadequate, and would easily tilt forward if made the only point of anchorage by the use of a clamp-band.

To gain sufficient firmness of anchorage, a plate is made to reach across the roof of the mouth, and attached by a string about the lone molar of one side, and by a little screw entering a cavity made by decay (filled with gutta-percha) in that of the opposite tooth. The plate, fitting about the various teeth as shown, is cut away in the rear of the right bicuspid teeth, in order to make room for them to be moved back, which is done by a thread attached at a point in the plate near the wisdom-tooth, and then passing forward and around them (the bicuspids) and carried back and attached to a screw which enters a nut vulcanized into the rear part of the plate, which operates by the use of a lever so as to tighten upon the bicuspid teeth, forcing them back.

Having gained the necessary territory for the accommodation of the cuspid and lateral incisor, a new and somewhat similarly constructed plate (Fig. 52) is then used, having a band which extends around the bicuspid teeth, and covering the entire length (side) of the crown, which serves not only to hold the bicuspid teeth in position but also as a ridge, over which a thread is made to pass, as shown in Fig. 53, which, after being tied to the lateral incisor tooth and extending beneath a pin set in the lingual surface of the eye-tooth and secured to a screw as before, and then tightened, lifts upon the arrested cuspid, at the same time dragging it back and outward, while the lateral incisor is being drawn down and inwardly into its proper position.

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* Nomenclature of positions. See Dental Cosmos for June, 1878, page 302.

Fig. 52.

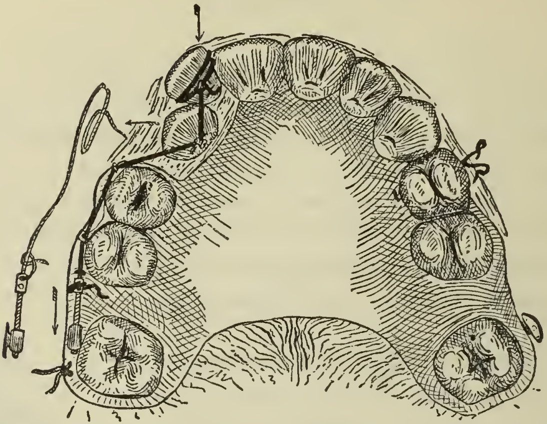


Fig. 53.

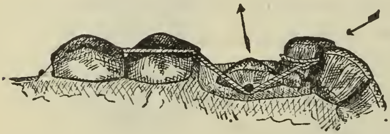
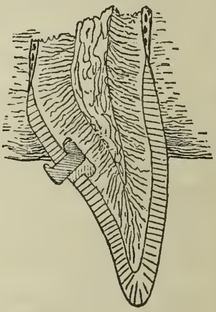


Fig. 54.



The pin is secured firmly in the cuspid tooth by having a foot upon one end, which sets in a little undercut hole drilled into it, the surplus room of which is filled with amalgam, as shown in Fig. 54. After the tooth is moved into its proper place the pin is ground away, leaving the cavity temporarily filled until the tooth has time to become sufficiently firm to bear filling with gold.

If it be thought objectionable to form a small pit in the cuspid for this purpose, and it is *possible* to accomplish the object in some other way, that of course should be adopted. Dr. L. D. Shepard suggests a useful plan of securing rings by the use of oxychloride of zinc.

(To be continued.)

NEW PRINCIPLES IN DENTAL PATHOLOGY. A REVIEW OF THE SO-CALLED NEW DEPARTURE.*

BY W. C. BARRETT, M.D S., BUFFALO, N. Y.

(Read before the New York Odontological Society, Oct. 15, 1878.)

At a meeting of this society held about a year ago, a paper having for its title "*Plastic Fillings, and the Basal Principles of the New Departure*," was read. That essay has attracted attention in some quarters, but much the greater portion of the profession has chosen to ignore it altogether. I cannot commend this course; for, if there be any new and great principle involved in this doctrine, the matter is worthy of our most careful consideration; and if it be a compound of errors, others have a right to an expression of our opinion to that effect.

He who discards old-established usage, and proposes a complete reversal of methods long in vogue—who places himself in direct opposition to well-established and accepted authorities—ought previously to carefully consider the ground he proposes to occupy, and be sure of his premises before stating conclusions. Luther, Kepler,

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* Editor Dental Cosmos.—In the April number of your journal I find two articles from the apostles of the so-called "New Departure," aimed at the paper read by me before the New York Odontological Society last autumn. I cannot see that there is anything new to answer, for personal vituperation is not argument, and they cannot establish their propositions by convicting me of moral deformity. If these modern Don Quixotes were so precipitate in placing their crude theories before the public as to sacrifice perspicuity, or if they now desire to shift their position to ground more tenable, I am not responsible. I endeavored to state their peculiar ideas fairly, and believe I have the same understanding of them as have others. Whether these theories were first promulgated by an essay read before the Odontological Society, or committed to memory and declaimed, matters not. It is the "reasonableness and consistency" of these vagaries which are in question. Nothing is easier than the making of wild predictions concerning the success of any proposed theory; but the wildest of these are not convincing proofs of its verity. I leave it to Time, who, ultimately, successfully solves all such problems, to determine which of us is right. Certainly, unless these new and strange doctrines soon begin their promised rapid spread, their propounders will scarcely live to see them bring to naught the teachings of Faraday, Huxley, and Tyndall, though, should they ultimately fail, it will not be for want of hallooing and noise. As comparatively few of your readers have ever had a chance to see my paper on the "New Departure," published, as it was, in a journal of limited circulation and now discontinued, I ask you, Mr. Editor, as the only necessary response to the articles in the Dental Cosmos, to republish it, that both sides may be heard.

Most truly yours, W. C. Barrett.

No. 11 West Chippewa St., Buffalo, N. Y., April 15, 1879.

Harvey, Newton, proposed, in their times, "new departures;" but they were themselves authorities in the positions they overthrew, and thoroughly conversant with and expert in such principles. It is a grave matter, this attacking a world. It may be an indication of the most determined courage, or it may be but an exhibition of the veriest foolhardiness. The assailant may be a true reformer, or he may be only a mistaken enthusiast. It is therefore our duty to critically examine new doctrines; to shun that undue credulity which disseminates error, as well as to avoid that pride of opinion which would close our minds to new ideas, simply because of their novelty. In this spirit let us examine the subject of the new doctrines.

I object to the proposed "New Departure," and cannot give it my support, because I believe it to be a mere vagary of the mind,—a fallacy which does not even rise to the dignity of a sophism.

To establish my right to thus sit in judgment upon this proposed new method of practice, I declare that I have studied the matter and patiently considered it; that I have instituted a system of experiments which I have observantly conducted during a period of more than four years; and that, the more closely I examine the matter, and the better I become acquainted with its basal principles, the more firmly is my faith in long-settled practice established.

To Dr. S. B. Palmer is due the full measure of credit for first presenting to the profession any theory concerning that which has since been modestly denominated the "New Departure." He is, you are aware, a *student*, according to the light given him. He is not a mere speculative theorist, searching for corroboration of a previously conceived hypothesis. On June 25, 1874, Dr. Palmer read before the New York State Dental Society a paper entitled "Chemical and Galvanic Action upon the Teeth;" wherein was first (to my knowledge) broached the theory of galvano-electrical disintegration of the teeth. The paper was warmly received, and Dr. Palmer was urged to continue his investigations. At the meeting of the same society, June, 1875, he read his paper entitled "Success or Failure in Dental Operations Chemically Considered;" and in July, 1876, another, called "Choice of Materials in Filling Teeth." These were his principal papers upon this subject. All were read before a society in which I was vitally interested, and hence they especially challenged my attention. I immediately after the hearing of his first paper commenced a series of experiments to practically test the truth of his assertions, and have ever since been engaged in closely watching that which would be likely to prove instructive.

And now let me give my reasons for believing the "New Departure" a fallacy:

First.—It is, to my apprehension, an entire misconstruction of scientific law.

Briefly stated, the theory rests upon these hypotheses: That, in the presence of an acid, any two diverse substances form the elements of a battery; that one of these is at the positive pole, or assumes a positive relation to the other, and is therefore disintegrated; that different substances have widely differing electrical relations; and that upon these relations depends the amount of the disintegration, and which of the elements is acted upon and disintegrated.

Now, nothing can be stated against these hypotheses, *as such.* It is the interpretation given to them in which lies the mischief. The New-Departurites confound *cause* with *effect.* The tooth, the filling, and the oral fluids form the elements of a battery. But the electric current is wholly dependent upon the chemical action of the fluids which generate it; instance the zinc and copper cell. In the presence of the acid the zinc is positive, and is corroded by—what? By the *electric current?* Not at all; but by the chemical action of the acid which *generates* the current. Yet the new doctrines call upon us to believe that electricity, *per se*, is the destroying force.

It is an axiom among electricians, that there is no electric current without some preceding molecular change; that an electric current is but the effect of some producing cause. Yet here we see it elevated to a primal importance, and designated as the *cause of the cause*,—a thing which has produced itself! To my apprehension, the galvano-electric current in the mouth is but the *effect* of tooth-decomposition through chemical changes in the mouth.

Second.—Any electric current which may be detected in the oral cavity is possibly due to other causes than the presence of the elements of a voltaic battery. There are constant thermal changes which are quite competent to deflect a delicate galvanometer. Before we alter our practice entirely, we desire to know that any possible current is traced to its proper cause.

Third.—An *electric* current may excite chemical action sufficient to decompose a compound, or even volatilize a simple substance; but a comparatively powerful current is required to do this. Most conductors are competent to carry away, without injury to themselves, all the electricity they are likely to receive. It is absurd to suppose it possible for any current to exist in the mouth capable of decomposing tooth-tissue.

Fourth.—If a gold filling in a tooth is capable of developing a current sufficient to excite the disorganization of bone, what must be the effect of a partial gold plate in the mouth? It might readily be supposed (according to the new doctrines) to be as bad as a charge of dynamite.

Fifth.—If the presence of metals (which, according to this new gospel, assume a negative relation to the tooth) be the principal or only cause for decay of the teeth, then unfilled teeth ought never to decay, and there should be no necessity for filling teeth primarily, since one of the elements of the battery is then wanting, and, by consequence, there can be then no tooth-disintegration. But, since this is not, in reality, the case, why may we not say that the same conditions which produce decay before filling, do so afterward?

Sixth.—In the consideration of any of the phenomena of Nature, we never need search for a recondite cause so long as ample reasons lie near the surface, or in full view. A very sufficient excuse for the disintegration of teeth after filling may be found in imperfect manipulation, and direct chemical action, without appealing to electrolysis.

Seventh.—In any case, an electric current is but one of the factors in the sum of tooth-decay, whereas, by the terms of this new doctrine, it is elevated to the importance of being the only cause worth taking into account. (See Articles II. and III. of the "New Departure.")

Eighth.—I consider this new theory fraught with evil to the dental profession, because young dentists are, in effect, taught by it that the years of patient, steady, persistent effort to reach a higher plane of excellence are thrown away, and that the unskilled recruit is fully the equal of the old veteran; that experience goes for nothing, and that firmly-established principles may be swept away by a single blast from a discordant trumpet. If there be no necessity for thorough excavation, as has been urged by the apostles of this new-fangled theory,—if a leaky filling is better than a tight one (see Article VI., "New Departure"),—and if the easily manipulated plastic fillings are superior to thoroughly impacted gold ones,—then the time, practice, and patient study necessary to learn the proper manipulation of gold foil are worse than thrown away, and those who have spent so many years in accumulating practical knowledge are the inferiors of the boys just commencing their career. Then, at the outset of my practice, when my ability did not extend beyond the inserting of amalgam into improperly excavated, wet cavities, I was a better operator than I now am, after fifteen or twenty years of constant deterioration in the line of gold practice!

Ninth.—The return to plastic fillings is the adoption of a practice which has been proven to be inferior. American dentistry is known and honored among all civilized peoples, and American dentists are conceded to be without foreign peers. Yet European dentistry differs from ours only in the materials used, and the consequent manipulative ability. Gold has been the mainstay of the American dentist, and the possibilities of this material have stimulated him to the highest attainments in manipulative skill. The European dentist has used, mainly, plastic fillings, and his progression in dentistry has barely kept place with the possibilities of his material. The abandonment of gold means the forsaking of the metal which has made the American dentist what he is, and the adoption of that material which has made the European dentist his inferior.

Tenth.—The proposed "New Departure" in dentistry rests upon a hypothesis toward the proving of which not one element of satisfactory evidence has been advanced. When Darwin, Tyndall, or other scientists, propose any new doctrine, it is the result of a long and exhaustive series of experiments, either performed in the presence of unprejudiced spectators, or the most minute details of which are carefully set down. Upon what extended series of experiments does this new theory rest? Dr. Palmer, in his paper entitled, "Chemical and Galvanic Action upon the Teeth," gives a brief account of a very few. He says, "We take teeth and pound them in a clean wedgewood mortar, somewhat fine, and connect the pieces with the gold, using dilute sulphuric acid, and we find tooth-bone an electrolyte, or positive: the gold will remain a negative. Between the tooth and the gold the action of the needle will be slight; between tin and gold, very great. . . . The next test is between tooth-bone and tin foil." Now, it seems to me that such experiments as these amount simply to nothing, in determining the points in question. In the first place, the conditions are not at all those found in the oral cavity. We do not question his very indefinite and inexact declaration, that "the greater the difference between two elements, the stronger the current;" but in what way does this prove that chemical disorganization of tooth-tissue is due to a galvanic current which this same chemical action develops? Tooth-bone, treated with sulphuric acid, may develop a current in the production of the resultant sulphate of lime; but we should not call this salt, so produced, the result of an electrical condition. If we are to abandon our present practice for a new theory, we desire to know exactly what experiments and proofs substantiate the hypothesis. We demand that trial tests be performed, either in our presence, or substantiated by such minuteness of detail as shall give others an opportunity to verify or disprove them. We want to know just what were the conditions of the tests. If it is stated that the galvanometer needle was deflected, we wish to know *what* galvanometer, and how it was used; for these instruments are not only very differently constructed and manipulated, but those of a kind vary greatly in results from each other. We ask what unit of resistance was used in the calculations; how the current was measured or shown; if measured, the number of ohms; if shown, whether it was by the galvanometer, the electrometer, by chemical action, by thermal effects, by induction, or "by guess." In short, we ask for *facts*, not speculations. Scientific men are not in the habit of accepting the crude ratiocinations of possibly interested men, in matters where carefully conducted experiments may practically solve the question.

If an active acid is used, letting go its hydrogen it unites with a base to form a salt, at the same time, and by this action, generating an electric condition. Hence, it is absurd to charge, *as the cause* of this action, one of its accompanying phenomena,—the result of a chemical action which would generate a current without the presence of any metal. Again, if the elements be subjected to thermal changes, as in the oral cavity, a current may be developed without the aid even of an acid; for instance, warm a piece of platinum, place it in simple contact with gold, and a current is at once developed. Or, put a piece of zinc wire in proper contact with that of a Thompson galvanometer, then *twist* the wire, and your instrument will indicate the presence of an electric current. In fact, electrical conditions are produced by all molecular change, but such currents will not decompose tooth-tissue.

In view of these facts, I dispute the conclusions advanced by the new doctrine. I say that the so-called "New Departure" contravenes the fundamental principles of physics. It contradicts all science and all scientific men. It is utterly unworthy of even our respect, until it be established by experiments in the mouth, conclusive, and often repeated, under all possible circumstances. Generalizations will not be sufficient, when it is sought by them to establish scientific truth.

But what are the conceded facts concerning this whole matter? In the February number of the *Dental and Oral Science Magazine*, page 7, the propounder of this theory says,—

"We have carefully, and, we believe, scientifically, investigated every line of experiment which has professed to show the current which, we believe, is eliminated by contact of metal with tooth-bone. This we have done with the best instruments and apparatus which our country can produce; and we find that such current *has never been shown, much less measured.* Even that curiously ingenious line of experimentation upon this subject which was presented at the Centennial Meeting of the American Dental Association, and which gave to our profession that scale of relativity known as the 'Harvard Tension Series,' in which gutta-percha was placed at zero and gold at 200°, and which gave those who had faith in gold such a 'black eye' (as it was expressed), we pronounce utterly worthless, and without any scientific basis." And again, the same author says, "Now you see, gentlemen, that, notwithstanding the fact that we are unable, as yet, to *demonstrate the existence of a current*, yet, nevertheless, the *reasonableness* and *consistency* of our theory is such, that we may say that gold, being a good conductor, and being itself unattacked, when placed in contact with tooth-bone must, on general principles, cause excessive electro-chemical action, which action must eventuate in the disintegration of tooth-structure,—*and therefore* gold is the worst material to use when a tooth is of such structure and in such condition as that it needs something which will help to preserve it."

Here we have it! It is NOT *demonstrated*, but *it is* SUSPECTED! What kind of reasoning is this to present to a body of scientific men who are searching for the truth?

And here I make my eleventh point against the "reasonableness" and "consistency" of this great discovery.

Eleventh.—The propounding of this "New Departure" presupposes a *theory*, which is the curse of study. Any one who is committed to such a thing is honestly liable to the charge of laboring to establish a foregone conclusion,—of working to prop an opinion formulated before all the evidence is in,—of pronouncing the shield all one color before looking at both its sides. Study should be to reach truth, not to sustain an expressed opinion. True scientific men, searchers after truth, do not start out with a theory and then endeavor to find seeming facts to substantiate it. They first accumulate their proven points, and from them deduce laws. All the scientific world has learned to shun the man with a theory. It has passed into an axiom to "beware of hypotheses." According to the confession of one of the propounders of this new doctrine, the whole matter rests upon deductions elaborated from an uncertain brain, rather than from an indisputable laboratory, and consequently is, until established by practical tests, unworthy our serious attention.

Heretofore I have been considering, more particularly, Dr. Palmer's electro-chemical theory. I now desire to say a few words concerning plastic fillings. On this point I find this modern "house that Jack built" divided against itself, and all the principles laid down for the guidance of its constructors deliberately ignored or determinedly contradicted by their authors.

Dr. Palmer says that the multiplication of elements in a compound intensifies electrical conditions, and therein corroborates the voice of science; yet the "New Departure" urges the use of complex compounds in place of simple substances, for the avowed purpose of avoiding that which, in another place, it declares intensifies the disturbed condition. Is this a part of the "consistency" and "reasonableness" of the new theory? All hydrocarbon gums, as gutta-percha, readily undergo the molecular changes which generate electrical conditions. Gutta-percha will slowly disintegrate, even in air. You all know how the surfaces of such fillings decompose and become spongy in some mouths. Theoretically (and the disciples of the "New Departure" cannot object to this manner of viewing the subject), the more simple the substance, the less it is affected by chemical or galvanic influences. The union of gold and tin is much more liable to develop a current than either alone. According to all scientific testimony, compounds are liable to evolve complex electrical currents which simple substances avoid. Of all the metals, gold is the least oxidizable and the most stable, and hence, from the stand-point of evidence adduced by the "New Departure" itself, it is the very *best* material with which to fill teeth.

On *prima facie* grounds (the favorite method of argument with the students of the "New Departure") compounds are, then, unfit to put in the mouth at all. None such are entirely stable, and the more complex their elements, the greater the probable electrical changes. German silver (nickel and copper) always tastes badly, because in the presence of the fluids of the mouth electrical changes are induced. The molecular changes attending the crystallization of amalgam, especially when accompanied by thermal disturbances, as in the mouth (it is *reasonable* and *consistent* to suppose), *must* develop a galvanic current; and accordingly there is almost universally a bad taste succeeding the introduction of amalgam fillings.

But on this subject I cannot do better than quote Dr. Palmer,—he who has furnished, ready-made, the basal theory of the "New Departure" (for the author of the paper read before you a year ago announced himself as simply the mouth-piece of Dr. Palmer). In the paper wherein Dr. Palmer first made known the result of his studies (read before the New York State Dental Society in 1874, and already quoted from), he says (Transactions of the New York State Dental Society for 1874, page 155),—

"A porous tooth containing an amalgam plug has in it the elements of a minute, yet intense, battery, capable of decomposing not only the plug, but the tooth around it; this is in accordance with a law of chemical affinity. . . . Chemical affinity cannot be cheated of its action, and the greater number of elements there are in a battery, the greater number of currents and counter-currents there will be; and galvanic action takes place on all surfaces of the mass, and within as far as moisture extends. We look in vain for amalgam plugs to be bright on the surfaces in contact with dentine. The action is between the compound and the mercury; while in tin only the outer surface is acted upon; that is, tin or gold represents one element each; and before any galvanic action can take place between such plugs and dentine into which they are inserted, there must be a space for a fluid to excite action.* With amalgam, the moisture in the tooth-bone is sufficient to communicate the current which exists in the plug to the tooth, and thus enlarge the cavity or diminish the plug or both.† . . . The fact is, the addition of metals to a compound only complicates galvanic action."

Thus, then, we find that the author of the electro-chemical theory can be successfully quoted against himself; and he asserts that amalgam compounds only intensify that electrical condition which, we are told, is the main source of tooth-decay.

And now in conclusion, I can only say that I have examined this matter as carefully as possible, and without any preconceived theories to establish. I have corresponded much with Dr. Palmer, and have endeavored to arrive at the *truth.* I desire to be courteous to those gentlemen with whom I am compelled to differ, but my courtesy does not go so far as to force me to accept their conclusions without a careful preliminary examination. For the results which they ascribe to galvanism, I am certain we need not go far to discover another cause, one much more in accordance with scientific law, and observed and recorded facts.

REPLY TO DR. W. C. BARRETT'S "REVIEW OF THE NEW DEPARTURE."

BY J. FOSTER FLAGG.

(Concluded from page 258.)

Ninth (Reason): "The return to plastic fillings is the adoption of a practice which has been proven to be inferior."

This position the "New Departure" most emphatically antagonizes. If the practice which depends upon the use of plastic fillings has been *proven to be* "inferior," why is the "Ideal Filling" always spoken of as "a plastic material"?

If the use of *plastic materials* tends toward an "inferior" grade of practice, why does the *so-called* "judgment" of gold-workers point to their employment in teeth which *they cannot save with gold?*

Is that practice "inferior" which *saves teeth* merely *because* the material used for that purpose requires less manipulative skill? If so, "dentistry" means *finger-skill*, not *tooth-salvation.*

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* That is to say, that any gold or tin plug which can excite electrical action prejudicial to a tooth, *must* have been *so badly inserted* as to allow space for penetration of moisture between it and the tooth; and hence, that a gold or tin plug, *properly inserted*, must be the *best* for the tooth, *since no galvanic action can occur between it and the dentine.*—W. C. B.

† Compare this statement with Article IX. of the "New Departure:" "Amalgam, *per se*, is an excellent filling material."—W. C. B.

If practice based upon the use of plastic filling has been "*proven inferior*," why are such strenuous efforts to obtain an acceptable *plastic* material so constantly being made, *not only in Europe* where the practitioners have "barely kept pace with the possibilities" of their materials, *but even in America*, where this marvelous skill in the use of the "metal which has made the American dentist what he is," has been "*proven*" most lamentably *unequal to the emergency?*

If American dentistry had been all that is desired, or if it had been in *much degree* that which the exigencies of our people demand, there would never have been any "New Departure;" and if, therefore, the "New Departure" is not any "New Departure" after all, the more's the pity!

Leaving the discussion of the inferiority of European dentistry, and the superiority of American dentistry, to those who really seem to believe in the infallibility of the latter, I would say that the "New Departure" accords to American dentistry *as typified in elegant, highly-finished "contour" gold work* an incontestable proof of great skill in this direction.

It, by no means, would do anything which, in its opinion, would tend to lower the legitimate standard of its loved profession; but it does not recognize in the *ability to make elegant gold fillings* any extended fulfillment of the mission of dentistry.

It recognizes that they are excellent *in their proper places*, but the smiling disclosure of china teeth by too many, far too many, of those who have, during the whole period of their existence, enjoyed the full benefit of the best gold operators, tells a story of the incompetency of gold to save soft teeth, even when worked with "passing skill," and even when *aided by plastic fillings*, used *too late*, according to the "*judgment*" of each individual operator.

It is to meet this *evident need* that the "New Departure" has been inaugurated, *not to endeavor to prove that "electricity decays teeth,"* but to endeavor to establish some scientific basis upon which to educate the coming dentist, that he may have that *knowledge* of the action of filling materials, when placed in contact with tooth-bone, which shall enable him to *have some judgment* upon which to predicate effort.

Again: the gentleman says, "The abandonment of gold means the forsaking of the metal which has made the American dentist what he is."

In the first place, the "New Departure" nowhere teaches the *abandonment of gold;* on the contrary, it knows just where gold can be satisfactorily used quite as well as does the essayist. Every one of its strongest advocates has had quite as extended opportunity for observation in this direction as the essayist has had.

We think that we have each given much more sufficient evidence of our capability of judging of this matter than has the essayist of his capability of judging of the merits of the "Basal Principles" of the "New Departure;" but "we" would have *mind* as well as *metal* have something to do with the making of American dentists,—that thus we may have gold *used* instead of *abused*, that we may have its power for usefulness defined, that we may see it exemplifying its utility, *whenever we see it*, instead of so very, very frequently only exemplifying the wretched combination of "defective manipulation" and "incompatibility of material with tooth-bone."

Every day of my office-life this is presented for my reflection, and every day brings me additional written assurance that other American dentists view this matter *just as do* the advocates of the "New Departure."

American dentists, as a body, recognize that the time has come when the mere cry of "Great is American dentistry" will not alone suffice to maintain for it that position which has perhaps been accorded it by all enlightened nations. This is as it naturally should be, *for excellence is best able to judge of its own deficiencies.*

American dentistry, with that *impulse* so characteristic of the American people, embraced with impetuous fervor cohesive "contour filling," that work which has, under its inflictive blows, caused more suffering, cost more money, crumbled more cavity walls, resulted in more failures and in more *needless* loss of teeth, than any other one mode of practice.

The truth of this statement is patent to all the *dental world*, and to hundreds of thousands of dental patients; those who deny this are the "few and far between," and every "annual address" before our dental societies, and every monthly issue of our dental periodicals, asserts the rapid "abandonment" of this "tried and found wanting" practice.

"Soft gold and hand-pressure" is the verdict of calm deliberation, and the "New Departure" asks, *in addition to this*, that gentlemen "*gradually discontinue* [these are its very words] *this packing of gold into teeth that are so poor, so frail, so unsubstantial, that it is, to say the least, doubtful whether the result will be creditable to your profession or satisfactory to your patients.*"

"*Commence, if you will, with those poorer and more miserable teeth which you would condemn to the forceps, and fill them with plastic fillings.*"

This is ALL that the "New Departure" ever has asked; and, that results might be the more satisfactory to others, as we have *tried* this practice for many years, we teach the S. B. Palmer "electro-chemical" theory, upon which is based a knowledge of the *relative compatibility* of filling materials with tooth-bone, that something, which at least *savors of knowledge*, may take its position as a *guide* in place of that *no knowledge* which until now has directed (?) each individual, according to his own "*judgment*," to use *some make* of *some plastic material* when he found that he *could not use gold*, and his conscience would not let him use the forceps.

This, and this only, is what the "New Departure" has *thus far* done, and it is this, *shaped up to suit*, which has been reviled by the few, and it is this, *hailed as the outspeaking of their own experience*, which has been welcomed most heartily already by thousands of our professional brethren, both at home and abroad.

Tenth and Eleventh (Reasons): "The proposed 'New Departure' in dentistry rests upon a hypothesis toward the proving of which not one element of satisfactory evidence has been advanced," etc.

The gentleman evidently holds fast to his peculiar view, that the "New Departure" means that "electricity is the great *cause* of decay of the teeth," and that the solidity of the "New Departure" theory can only be established by demonstrating the existence of this terrible, disintegrating current; and because we ANNOUNCE (not merely *admit*) that such current has "*never been shown*," the essayist concludes that "not one element of satisfactory evidence has been advanced."

It is well known that *at one time* (some years ago) Dr. Palmer, Prof. Chase, and I all thought that, as a final, convincing proof of the *relative action of filling materials* when placed in *contact with tooth-bone*, stronger and stronger currents *demonstrated* the lessening ability on the part of materials to retard the progress of dental caries.

It is well known that this work attracted such attention as to induce the undertaking of a series of experiments in this direction at Harvard, with apparatus so ingeniously devised, and with electrodes so scientifically (as was thought) prepared, as to leave no room for doubt as to the reliability and accuracy of the results.

It is well known that a "Tension Series" was presented at the meeting of the American Dental Association at Philadelphia in 1876, which placed gutta-percha at "0" (signifying *greatest* tooth-saving capability), and which placed gold at "200°" (signifying *least* tooth-saving capability),—a series of experiments which were *honestly* believed in by the gentleman who presented them, and which were *not controverted* by any of the believers in gold, but were *endorsed* by gentlemen of the dental and medical departments of Harvard.

"We" of the "New Departure" regarded these experiments *not as of first importance*, but as of *great importance* as *collaterals*. *Our* experiments of *first importance*, and which *we think* do possess a *great many* "elements of satisfactory evidence," are those which, extending over a series of many years, *have been done in the mouth*, carefully tabulated, by the hundreds, and *results noted.*

These have given us *the facts, for which* FACTS we desired a *reasonable theory* in explanation.

The *electro-chemical* theory of Dr. S. B. Palmer presented itself to both Prof. Chase and myself as eminently worthy of much consideration, and therefore a union of forces was proposed for the purpose of *carefully*, *calmly*, and *thoroughly* considering that theory which seemed best to accord with *facts*.

This was *not* (as the essayist intimates) "speculation,"—*it was work*,—just what "Darwin, Tyndall, or other scientists"* would have done if they had done rightly.

Moreover, recognizing that while our ability in working upon purely dental matters might not be questioned by the majority of our fellow-practitioners, they would have a right, and a very clear right, to question our authority upon galvanic, electric, and metallurgic science, we agreed to call to our aid the help of gentlemen of known ability in these directions.

Our friends Prof. Morton, of Hoboken, Prof. Snyder, of Philadelphia, and Messrs. Eckfeldt and Du Bois, assayers of the Philadelphia Mint, have ably co-operated with us in our *extended experimentation*, and have given us *such insight* of these matters as makes all the last half of the "*Tenth*" *Reason*, which refers *in an apparently quite learned manner* to "what galvanometer" and "what unit of resistance" and "what number of ohms" and "electrometers" and "thermal effects" and "induction," *and all that*, to appear as so innocently superficial as to be perhaps best expressed by the essayist's own words, "crude ratiocination"!

The essayist then having informed the members of the Odontological Society, as a last piece of information, that *twisting* a wire would generate a current which would deflect the needle of a Thompson galvanometer!—an experiment which every high-school boy is, or ought to be, familiar with,—"disputes the conclusions advanced by the new doctrine," states that "the 'New Departure' contravenes the fundamental principles of physics," and that "it contradicts all science and all scientific men."

In reply to this latter statement, I would say that, as the conclusion of this *Tenth* Reason, the essayist gives *two* quotations from my remarks before the Odontological Society, ingeniously (but not so *ingenuously*) placed together, as might be the head and tail of a horse *without the body*, to represent that noble animal!

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* I refer, in this connection, to Darwin and Tyndall, merely because these gentlemen are *named by the essayist as typical investigators*, and not in approval of their work, for I neither affiliate with their doctrines nor sympathize in the least degree with their views.

In this connection the *body* would be well represented, and the gentleman's opinion as to the "fundamental principles of physics," etc., be most decidedly antagonized by this statement of Prof. Morton: "Supported by your facts of observation, and the *reasonableness* and *consistency* of the electric theory, you may well rest your case there."

This is *truly* how it appears to *one* "scientific man."

Again: Prof. Morton says, "But it is, of course, very important not to give your opponents a chance to attack, by resting, for a proof of your theory, on experiments which are themselves unsound and capable of confutation."

It was, then, for this purpose that much work was done,—done, *as we have stated*, "with the best instruments and apparatus which our country can produce;" current elimination was done with the utmost care, and, as the result of just such experiments as none but able scientists and metallurgists could have devised, *we proved conclusively* that the currents which "general electrical principles" taught us must be *eliminated* in greater or less ratio by conductors of varying conductivity, and which must be *generated*, in greater or less degree, in proportion as contact was made between materials differing more or less in potential. *had never been demonstrated, much less measured,* AS GENERATED BY CONTACT BETWEEN FILLING MATERIAL AND TOOTH-BONE.

This "we" agreed upon, and it was *our duty to ourselves and to the dental profession that we should give the result of our labors.*

And yet THE CURRENT IS THERE!—and when *gold* and *tooth-bone* are in apposition the difference in potential is such as that, by the Palmer *electro-chemical* theory, the *rapid disintegration* of soft tooth-tissue around the gold filling is, *to us*, satisfactorily accounted for; and when *gutta-percha* and *tooth-bone* are in apposition, the great power on the part of the gutta-percha to *prevent disintegration* of soft tooth-tissue is, *to us*, equally satisfactorily accounted for; but FIRST, for us, was needed the *fact* that soft teeth *did decay apace* around *gold* fillings well introduced,—THE VERY BEST,—and that soft teeth *were well preserved* by fillings of gutta-percha, *even though* these were *hastily put in* merely to serve "*a temporary purpose*"*!*

And now, in conclusion, *I desire* to "review" the Basal Principles of the "New Departure."

These *do* teach that filling material, which differs most in *potential* from tooth-bone, is *least* capable of insuring protracted arrestation of dental caries. They teach that filling material most in consonance *potentially* with tooth-bone is *most* capable of insuring protracted arrestation of dental caries, other physical attributes, such as durability of material, etc., only modifying such result.

They teach that "in proportion" as filling material *permits* decay so is *electricity evolved* in quantity, and "in proportion" as filling material is possessed of *electrical conductivity* and is *not liable to be attacked* (tarnished), so is the electricity freely *eliminated*, and galvanic action permitted to add its quota toward *aiding* or *intensifying* that *chemical* action which results in establishing ordinary dental caries.

They teach that "in proportion" as filling material does *not permit* decay, so is the evolution of electricity confined to that small quantity which is the natural sequence of *limited chemical disintegration*, and that "in proportion" as filling material is *non-conductive electrically* and *is liable to be attacked* (tarnished), or, better yet, is *non*-metallic and *non*-conductive, so is even that electricity which is evolved, slowly *eliminated*, and *thus* is the possibility of tooth-disintegration reduced to the MINIMUM, and the *probability of tooth-salvation increased to the* MAXIMUM.

They teach that *knowledge* of the probable efficiency of tooth-filling material may be "reasonably" inferred by experimental comparison of material with the "Tension Series" of Volta, and that as there we find the metals lead, tin, copper, silver, gold, *in regular order as they are known to be conservative of soft tooth-tissue*, so may it be presupposed that materials possessing *less* conductivity, or more liability to attack than is lead, would be even *better than lead*, as *is* gutta-percha; and, inversely, it might also be presupposed that materials possessing *more* conductivity and *less* liability to tarnish than is gold, would be even *worse than gold;* but at present we know of *no filling material* (recognized as such by the profession) which has proven itself in teeth of the *softest* structure worse than gold.

The "New Departure" teaches, finally, the renunciation of the idea (broadly stated) that "gold is *the best material* for filling teeth," and that "in the skillful manipulation of this material is comprised much of the highest attainment of dental science," and the adoption, in place of these views, of the theory of a *special adaptiveness* to meet certain demands on the part of *various filling materials*, each of which is *best* in its *proper place*, and that the *proper use* of each is *not governed* by the individual "judgment" of *any* operator, be he "third class," "*second class*," or even "FIRST CLASS"! but that it is governed by LAWS which are as immutable as are those of any other exact science, and the study of which must form largely the curriculum of the future dental student, in place of that exhaustive devotion to manipulative effort in connection with *gold*, which has heretofore so overshadowed the glorious possibilities of which a broader, *higher*, BETTER dentistry is capable, in the accomplishment of *almost universal* TOOTH-SALVATION.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.*

Regular meeting held at the residence of Dr. A. L. Northrop, No. 44 West Forty-sixth Street, on the evening of February 18, 1879.

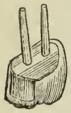
The president, Dr. A. L. Northrop, in the chair.

Incidents of Practice.

Dr. William Jarvie, Jr., Brooklyn. At our last meeting some methods of attaching artificial crowns upon bicuspid and molar roots were described, all of which required great skill and considerable time, and so the operations were necessarily quite expensive to the patient. I have here a very simple but quite efficient style of attaching an artificial crown upon the roots of bicuspid teeth, when such roots are bifurcated and quite small. After the model is obtained, drill holes in it to correspond to the pulp-canals in the roots; fit into these holes iridium wire of the proper size; make a cap of thin platinum to cover the end of the root, and solder the iridium wires to it in their proper positions. After this is done, grind the artificial crown to fit the model with the platinum cap and the wires in position; secure the tooth in place with wax, and detach from the model the tooth and cap; imbed in plaster and asbestos, back the tooth as for ordinary gold plate, and solder. We then have the tooth (as seen in Fig. 1) with a wire fitting into each of the two roots.

To secure the tooth to the root, mould some Hill's stopping around the wire, taking care to have a surplus, and hold the tooth over a spirit-lamp with tweezers, for it must be heated more than the fingers will bear. When warm enough, press it firmly home, and hold in position until the gutta-percha becomes hard, after which trim away the excess that has been squeezed out.

Fig. 1.



Crowns set in this manner are perfectly firm; the end of the root is protected from moisture, the operation need take but a few minutes' time of the operator, as all the work, except preparing the roots, is done in the laboratory, and thus will be prevented the necessity, in many cases, of wearing a plate when it is desirable to replace lost or broken-down crowns of bicuspid teeth of which the roots are bifurcated.

Dr. N. W. Kingsley, New York. An apology would be needed for what I have to offer you to-night if I were addressing you alone, but

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* Owing to the absence of the stenographer, the report of this meeting is unavoidably condensed.

I realize that I am not speaking to my personal friends of the Odontological Society, most of whom are familiar with my subject, but rather through them to the ten thousand readers of the DENTAL COSMOS scattered throughout the world.

REGULATING TEETH.

On the 10th of January just passed, I commenced the regulation of the teeth of the upper jaw of a miss of ten years of age. The cast of the mouth taken at that time, and shown in Figs. 2 and 3, is that of a true V-shaped dental arch. My first step was the adaptation of a vulcanite plate with a jack-screw across the mouth against the bicuspids, as is shown in Fig. 4. This plate had a bearing against the bicuspids and the sixth-year molars, but the pressure came principally against the bicuspids. The plate was split, as seen in the illustration, to permit of expansion under pressure.

FIG. 2.

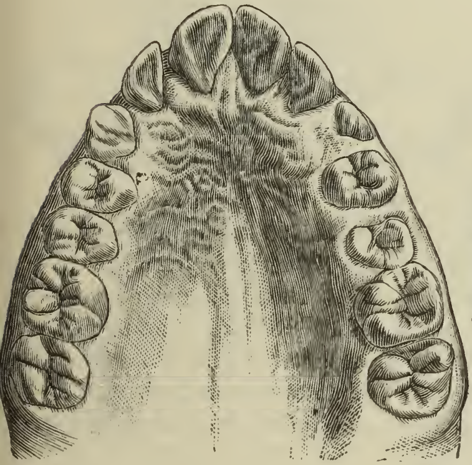
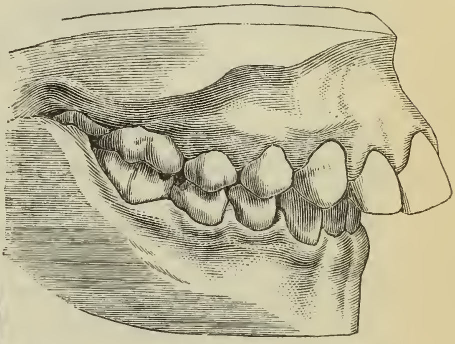


FIG. 3.



The slab in the central part was for the more convenient attachment of the elastic ring, which was afterwards tied farther back to give greater strain. This fixture was worn from one to two weeks, the screw being tightened daily, until all the width of arch was gained that was required. The arch spread readily and rapidly, probably from the elasticity of the external walls rather than from any absorption.

The last two or three days that the jack-screw was worn, an effort was made to reduce the prominence of the incisors by slipping a small rubber ring, cut from tubing, over the jack-screw, and drawing it forward to the mesial line of the central incisors, and there tying it to a cross-bar on the front or face of the incisors. As soon as the jack-screw became unnecessary, a new vulcanite plate, adapted as a retaining plate to the widened arch, was introduced, and this became the anchorage of another rubber strap, to which was attached, for greater convenience, a little gold cross-bar for the incisors with a little stem and an eyelet, passing between the teeth, as shown in Fig. 5.

Fig. 4.

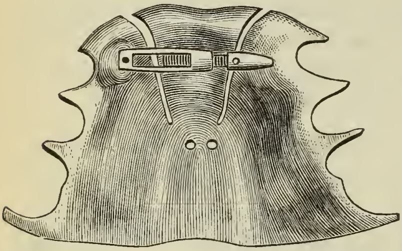
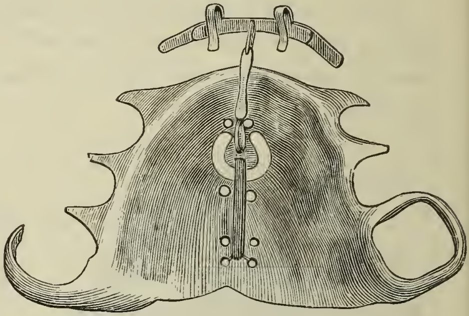
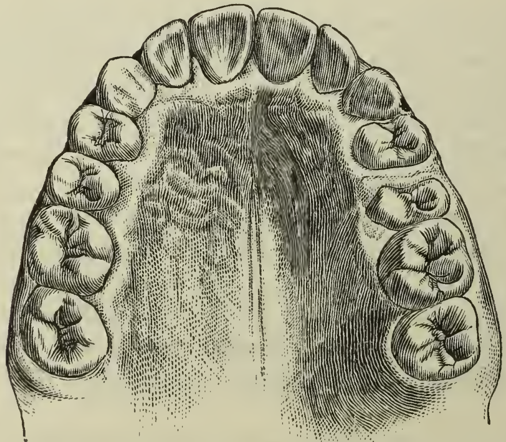


Fig. 5.



The stem was made long enough to rest its end upon the vulcanite, and thus keep off pressure from the gums. To keep the cross-bar from slipping up into the gum, a little hook came down over the cutting edge of each central, and this completed the appliance for regulating, save that as the centrals became flattened the cross-bar was lengthened to bear on the laterals, and at a later period and for a short time only included the canines. The horseshoe-shaped opening seen in the plate, Fig. 5, was made as a ready means of attaching the

Fig. 6.



rubber ligature, but in consequence of the lengthening of the stem of the brace the ligature was afterwards fastened farther back, as seen in the engraving. In just five weeks from the day when the operation was commenced, the process was completed, as shown in Fig. 6.

All that now remains, so far as the upper jaw is concerned, is to wear a retaining plate until permanency of position is secured. A subsequent endeavor will be made to throw the lower jaw forward, as the former articulation is broken up, and a new one must be formed.

I desire to call your attention especially to the simplicity of this whole apparatus.

One or two vulcanite plates so devoid of intricacy that any one could make and adjust them; and although the cross-bar and stem may seem a little more complicated, they are really not essential to success. By pulling the rubber forward and tying it to a bit of broken match, the same flattening of the centrals would result.

The introduction and removal are so ready that the patient herself can attend to it, giving ample opportunity for cleansing the mouth, a feature so important when fixtures are constantly worn. I can conceive of no appliance so admirably adapted to "Regulation made Easy" as this.

This last remark leads me to some comments upon some papers in the DENTAL COSMOS bearing the above title. I should hardly have thought them of sufficient importance to call for a notice were they not published in the foremost dental journal in the world, and thus given a kind of position.

In reading them over, I am forcibly impressed with the idea that they should have been called "Regulation made Easy—*on Paper*," for certainly the complexity of the apparatus and the ideal character of the illustrations takes them out of the realm of actual practice.

For example, on page 84 of the DENTAL COSMOS for February, 1878, the author illustrates a case which, on page 81, he calls the thumb-sucking type of irregularity, where the four or six upper front teeth project abnormally.

Here we have a description of an apparatus made of metal—gold or platinum—fastened on each side to molar teeth by metallic bands, and screwed tightly to its place. Next we have a gold band going around each of the front teeth, and to each band is a screw-threaded stem pointing toward the throat. These screws pass through a portion of the plate, and are tightened up one by one by a nut on each, and as they are toward the center of the mouth they require a curved key to operate them. Any one can imagine the difficulty on the part of the patient in feeling about for the separate nuts and turning them in this reversed position.

The author does not give us the age of the patient nor tell us how long this appliance was worn, nor show us the completed result; and an experienced eye in studying the illustration will query if it is not altogether an imaginary one.

When I contemplate the frail organizations of most teeth at the age when we attempt to regulate them, the danger from the prolonged use of metallic bands tightly screwed on, the difficulty in managing such a piece of machinery, the impossibility of its ready removal, and moreover its doubtful application to any practical case, it seems to come far short of the promising title under which it appears. I am reminded of the amateur generals we see in the nursery with their wooden soldiers set over against each other in battle array, when with one kick whole phalanxes are swept away, and they call it "victory made easy."

Dr. S. G. Perry, New York. In one of the articles alluded to, Dr. Farrar advances the idea that the pressure of rubber in regulating is injurious to the teeth and gums, and that the pressure of a screw avoids all this injury. He also claims that he has discovered the dividing line in the movement of teeth between physiological and pathological action. I would like to ask Dr. Kingsley if his experience corroborates those statements.

Dr. Kingsley. In regard to the first idea, I have had a long experience with both screws and rubber, and I have never yet been able to detect any difference with certainty. Pressure is pressure, without reference to the source from which it is derived, and if the gums are protected from irritation by preventing attachments to the teeth from impinging on them, a given pressure will produce the same result, whether by a screw or by the elasticity of rubber.

I use and prefer a screw in all cases where I desire rapid movement and the screw is admissible; but there are many cases where rubber is far more convenient, and where rapid movement would be dangerous.

The so-called law, which the before-named writer promulgated, that a movement of teeth greater than $\frac{1}{240}$ to $\frac{1}{160}$ of an inch every twelve hours would excite a pathological action injurious to the patient, is also imaginary. It is quite likely that in a given case such a result might be seen. But you cannot bring either physiological or pathological action under a rule of mathematics. The factors which went to make up that case might never appear in another patient, nor in that one at another time.

Take for example the case I have brought before you this evening. In widening the jaw the progress was much more than the rate at which he places the limit, and there was no uneasiness on the part of the patient which disturbed her; but in the contraction of the arch the progress was very much slower.

In the first place, the alveolar arch was widened, not by absorption of the outer walls of the tooth-sockets, but by their giving way through their vascularity and elasticity under pressure. There was no harm, no fracture, no sequestrum formed, but the arch could not be contracted until absorption set in and removed the bone to permit the movement.

It is not possible that a mathematical law can be discovered that will measure such action and be of such wide application as to take in the whole human family.

Dr. Wm. H. Atkinson, New York, thought that physiological and pathological knowledge were more clear to Dr. Kingsley than to Dr. Farrar. He had taken the same views with regard to Dr. Farrar's articles in the DENTAL COSMOS as were advanced by Dr. Kingsley. In his own practice, in regulating cases, he used simply rings cut from rubber tubing, arranging them by the aid of floss silk so as to avoid injury to the gums while drawing the teeth into position, and making the teeth themselves the sole anchorage. In many cases of children a week would suffice to complete the operation. The amount of strength thus applied is not great, but continuous. After having got the teeth into place, take an impression with the rubber rings in place, smoothing them off from the resulting cast. Then take half-round platinum wire, of the necessary strength, and run it around the arch in a continuous length, inside and out, nipping it in between the teeth, and generally arranging it so as to form a fit to the outer and inner surfaces of the teeth, and where the ends again come together solder them. This method possesses many advantages over the retaining plates ordinarily used. It is not painful, it is not in the way, it does not interfere with speech, and the teeth can be easily cleansed while wearing it. This method of regulating can be done upon short, or even with unerupted, teeth.

During the process of regulating there occurs slight irritation, which most dentists magnify into inflammation. It is really only a stretching of the alveolar borders.

As to patients experiencing pain during operations, most of the trouble from such cause comes from the suggestions, either of words or manner, of the operator himself, who puts into their heads the idea of pain, which they accordingly feel in excess.

He lately saw a lady in consultation, who, the physician claimed, was suffering from syphilis. Four or five dentists advocated extraction of the left superior central, the tooth involved. He could discover nothing in the history pointing toward syphilis. He drilled into an abscess on the end of the root, injected salt and water, and brought out a small clot of blood. The case was simply one of those where the pulp dies without ostensible cause. The dentist in charge said he had used dilute sulphuric acid. Told him he would have done better not to have diluted it. Injected a saturated solution of salicylic acid in alcohol, and left no tents or dressings.

Dr. E. A. Bogue, New York, gave a method of extracting broken broaches or other small instruments from roots, which consisted in twisting one of Schmitt's pulp instruments into the shape of a corkscrew around a watchmaker's broach. This corkscrew having been passed into the root and engaged with the broken instrument, is turned the reverse way, which causes the folds of the corkscrew to tighten around the broken instrument, so that it can frequently be withdrawn at once.

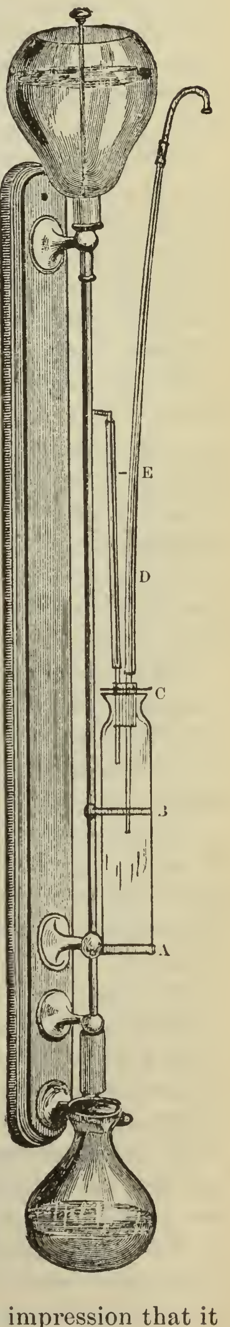
Dr. A. H. Brockway, Brooklyn, related the method of Dr. R. McGregor in a similar case. He had made a delicate hollow drill having a screw-thread cut inside. Carefully working down the canal with this, he was finally able to get sufficient hold upon the piece to enable him to draw it out.

Dr. C. E. Francis, New York. Quite recently a young lady called upon me for professional advice and attention. She complained that her teeth were very rough, her gums sore to the touch, and sure to bleed whenever the tooth-brush was used. Upon examination, I found that nearly every tooth in her mouth was completely encircled at its cervical aspect with dark-colored calculus. This had insinuated itself beyond and beneath the border of the mucous membrane, cutting asunder the dental ligament and then invading the territory of the alveolar process. The latter, shrinking from the approach of this baneful deposit, had become greatly absorbed, the gums were dark-colored and tumid, and all the teeth quite loose.

As her teeth were of high-toned and excellent character, faultless in shape, size, color, and manner of articulation, I viewed in amazement the deplorable condition of what apparently had once been in every particular a most perfect denture. Taking an instrument in my hand, I endeavored to remove the calculus, but to my astonishment found the deposit so hard and firmly attached to the teeth as to render its removal extremely difficult. After gently rebuking the young lady for neglecting so beautiful a set of teeth and suffering them to become thus badly incrusted with calculus, she assured me that she had given her teeth the best attention possible, cleansing them regularly and systematically each day, and having them frequently examined and occasionally scaled by her former dentist.

With a view of ascertaining the cause of this unnatural condition of the young lady's mouth, I asked if she had ever made use of charcoal as a dentifrice, when she informed me that it had been her custom to use it for years, and that her dentist recommended or approved its use. The reply to my inquiry did not greatly surprise me, but the additional information surprised me not a little. Was it not strange that her dentist, who for years had been the guardian of her oral gems, and witnessing from time to time the shocking condition they were gradually assuming, should not have discovered the cause of the mischief and saved her teeth from the impending ruin? And how surprising, too, that a dentist who has had opportunities for investigation and years for observation should recommend so deleterious an agent as pulverized charcoal for a dentifrice! And yet it is true that even to-day many of our brethren are still recommending this loathsome and pernicious substance to their patients for daily use! Why they do so is to me a great mystery. No dentist of any extended experience can have failed to observe its destructive tendencies where it has been used as a dentifrice. It has caused the loss of thousands of excellent teeth, as legions of edentulous jaws have borne witness. For this reason, therefore, it should never be employed, no matter how finely it be pulverized. The harsh insoluble particles are easily forced by the brush between the teeth and beneath the margin of the gums, forming a nucleus or base for the deposit of calculus, which irritates the gums, severs their connection with the teeth, provokes absorption of the alveolar process, leaves the teeth without support and ready to fall out. Like India ink in tattooed flesh, it often remains, a fixed and indelible blemish to the gums, and even after every tooth has fallen out the dark festoons of carbon may be seen plainly stamped on the mucous membrane, investing the alveolar border.

FIG. 7.



A, a shelf on which the bottle rests; B, a ring to hold the bottle; C, a rubber cork perforated for two glass tubes; D, the tube going to the patient's mouth; E, the tube connecting the ejector with the saliva bottle.

We desire that our patients should keep their teeth clean, free from extraneous deposits, and they need some sort of a dentifrice; but substances that are insoluble should be avoided as much as possible, lest they lodge in the interstices, cause irritation to the tissues, and induce alveolar absorption.

The following paper, entitled "A Modification of the Saliva Ejector," by Dr. William Herbert Rollins, of Boston, Mass., was then read:

This modification of the Saliva Ejector is presented to the Odontological Society under the impression that it may be of use to some of the members. During a four years' trial of the Fisk ejector, the machine was frequently stopped by pieces of punk, gold, and softened tooth-substance. The idea of overcoming this by having air alone drawn into the ejector came to me two years ago, but remained simply an idea until last month. Then, in a new location, there was not sufficient water-pressure to work a Fisk ejector.

A Snow ejector was then purchased, but its action was irregular, for the viscidity of the saliva would hinder its working unless a large amount of water was used. Also, in operating in a sitting posture, the patient's head was lower than the tube at its point of entrance to the machine, thus causing the weight of the saliva to become an additional obstacle.

These defects are overcome in the modification herewith presented.

The tube from the patient's mouth descending, the weight of the saliva is utilized. The bottle into which the saliva flows should be tall and narrow, to enable the openings of the glass tubes to be far apart; because, if they are near together, bubbles of saliva will be carried to the ejector. The bottle should be placed low, with the flexible tube going directly to the patient's mouth. As no saliva is drawn into the ejector, the water may be used many times, and, colored with a little aniline red, green, or blue, will be attractive in appearance.

The mechanical details of the arrangement may be changed. Thus a simpler way of fastening the bottle to the upright would be by a ring like that used for the White spittoon; or the bottle into which the saliva flows may be at a distance from the ejector, and out of sight. My own is directly under the operating chair.

The advantages of the modification are: 1st, it furnishes a means of collecting the saliva, unmixed, for examination; 2d, it prevents the saliva from entering and impeding the action of the ejector; 3d, the weight of the saliva aids instead of hinders the operation of the machine.

The most important result of the modification is the ease with which the saliva can be collected for examination. The result of extended investigations on saliva seems to be the light which shall penetrate the darkness surrounding the causes of dental decay. Are we doing our duty as orists when we neglect such investigations? In these examinations, the rapidity of decay in the teeth, the age, the sex, and the general condition of the patient should be noted. The results will have a proportionately greater value if the saliva be obtained at different times from the same patient. I should be glad to receive the results of all such investigations.

Dr. W. T. Laroche, New York, exhibited and described his saliva receiver. It is in the form of a rubber bib or pouch, the opening of which receives the chin and the lower portion of the rubber dam, and has rubber straps which pass around the head to keep it in place. In use the saliva flows out of the mouth under the dam, into the pouch, where it is caught. Before removing the appliance, the dam, disengaged from the teeth, is slipped wholly into the pouch; thus removing at once all the rubber apparatus from the face. The appliance has simply to be washed and dried in order to be used for an indefinite length of time.

Dr. Benjamin Lord, New York. Mr. President,—The cleansing and care of the teeth, the subject named for discussion this evening, is a broad one, covering, technically, about all that we are called upon to do to the teeth. But I suppose it is understood that we are to speak only of cleaning or freeing the teeth from stains and all foreign substances, and something of the care of the teeth on the part of our patients.

As teeth come to us we find them in all conditions of uncleanliness, from slight stains on the enamel to deposits of tartar an eighth of an inch thick. Stains or discolorations can readily be removed—and ought to be—for the most part with sticks of soft wood, as red cedar, charged with powdered pumice. When the stick is not sufficient, we may use an instrument tempered hard, with a hard edge, observing proper care not to scratch the enamel. Deposits of tartar on the enamel or crowns of the teeth only are easily removed with instruments suitably shaped and tempered; after which the enamel should be polished with the stick and pumice. In all such cases I believe it will be found that neither the teeth nor the gums have suffered from the accumulation of tartar merely; and with a very large proportion of persons, such accumulations never affect the gums or the tissues below the necks of the teeth. But in many cases the tartar is deposited under the gums, and insinuates itself down the roots; and as soon as this is the case, a troublesome condition ensues,—irritation, inflammation, suppuration, and loss of the parts and teeth.

There can be no question that the general constitution, giving character as it does to the secretions of the mouth, has much to do with the loosening of the gums, allowing the tartar to be deposited upon the roots.

Of course the treatment, as well as its success, will depend upon the extent of the trouble. If the inflammation and loss of tissue is not considerable, the tartar may be removed, and an application made, directly to the parts, of a strong astringent and stimulant, such as iodide of zinc, by means of a stick or a bit of bibulous paper on the point of an instrument; upon which a reasonably healthy condition may be secured. Of course, the loss of the parts is never restored, and it will be necessary to repeat the operation every three or four months, in order to keep down, even fairly, the disease.

If the tartar has been deposited far down the roots, and suppuration with considerable loss of the surrounding tissues has occurred, with consequent loosening of the teeth, I feel that not much permanent good can be accomplished; yet even here we should use all the means and labor which can possibly benefit the case. If the disease, being so considerable, is confined to only a few of the teeth, and particularly if these be already quite loose, it may be best to extract them.

But if the suppuration is slight, the teeth not loosened very much, and if the tartar can be thoroughly removed, then a very strong solution of chloride of zinc applied directly to the parts as far down the roots as the tissues have been destroyed, will very often be of great service in improving the local condition.

The chloride of zinc I find to be the very best escharotic and stimulant for a suppurative condition of the sockets and gums.

Of course, everything will depend upon the accuracy and thoroughness with which the tartar can be, and is, removed, and then prevented from again accumulating.

I want to say a word about the so-called "Riggs's disease." Of course, this disease is not new, nor is its recommended treatment new, nor as good, in my opinion, as the methods practiced by many others. The instruments used and recommended by Dr. Riggs are not well adapted to proper manipulation, being too large and too long in the blades or points; the right-angled turn of the blades with the large shaft and handle also making a clumsy and unwieldy instrument. With such instruments the whole operation is unnecessarily harsh and painful, and with them the idea of removing the roughened faces of the alveolar process is simply a delusion. I was at considerable pains to visit Dr. Riggs at his office, a few years ago, to witness his operation and learn the results. I there had an opportunity to see the operation performed, as also to examine a case which had been similarly treated, and both were entirely unsatisfactory.

I have brought my instruments for cleaning and polishing the teeth with me, and offer them for the inspection of those present. They are made of different thickness and temper, according to their special use; those tempered hard are for the removal of tartar and the trimming of proximate fillings. They may also be useful in separating the incisors. By drawing the temper very slightly, a filed edge can be given the instrument by draw-filing, which is sometimes more effective to take hold of the tartar under the gums and the overhanging edge of fillings.

The spring-tempered are for the examination and polishing of proximate surfaces; the thinnest can be forced between nearly all the teeth, and are found to be eminently useful in ascertaining the exact condition and extent of the contact surfaces.

It is simply claimed for the excavators that the curves and flexibility of the shanks of the instruments give more power, more ease and grace in the hand, and better adapt them for reaching all parts of the cavity, particularly the more inaccessible.

There can be no question that a proper degree of flexibility of the shaft gives power and ease in handling to all instruments.

In regard to the care of the teeth on the part of our patients, and of persons generally, there is a "plentiful lack" of correct information. With most persons the use of the brush is all that is thought necessary to keep the teeth clean and to preserve them from decay. We constantly hear persons say that they are in the habit of brushing their teeth three times a day, and cannot see why they continue to decay. Parents, also, tell us that they cannot get their children to brush their teeth, "and of course they decay." Now, it is possible that we may be greatly at fault in not correcting such an error, or exposing the fallacy of this popular belief in the brush. For we know well that the use of the brush does not, and cannot, prevent decay to any considerable extent, since it cannot touch those dental surfaces most liable to the attacks of decay. Hence it may be said that the brush is of little or no use in preventing decay, and is only useful as a mouth-washer. Also, we know that the brush almost ruins a great many teeth. They are *brushed to death.* The gums are destroyed and the teeth furrowed. I have sometimes felt that it would be better if tooth-brushes were abolished, for in that case other and much more effectual means would be introduced for really cleaning the teeth.

It is an axiom that in proportion as the teeth are kept clean, decay will be prevented. Now, the questions arise, is this thorough cleanliness practicable in general hands, and, if so, how can it best be attained? The use of floss silk is a help, and a great help, *if it is used faithfully;* but only the very few will so use it. Toothpicks cannot be passed between the teeth, unless there exist natural separations; and in such cases will be little needed, for the teeth under such conditions are mostly self-cleansing. We find that if the teeth are so situated as to present natural separations, or so shaped and placed in the arch that proximate contact is only slight, they are not only very readily cleansed, but are, in the main, self-cleansing; and such cases almost never decay on the proximate surfaces. These, I believe, are established facts, and should be general guides in determining what means shall be used to secure thorough cleanliness on all sides of teeth that are not thus situated naturally.

It is my firm conviction that our art should come in and be applied just here, and that the teeth should be so separated or shaped that they can be readily cared for and cleansed by toothpicks and floss silk, or be made self-cleansing, always securing a point of contact between them, either at the grinding or cutting edges, or at the necks. This operation must be performed early in life, before the teeth have decayed, in order that the character of the separations or shapings may be controlled.

It may be asked if I would separate or shape all teeth. Most emphatically I answer, *No;* for quite a large proportion of teeth, particularly the incisors—superior and inferior—are so isolated, or their forms are such, that they are, in a great degree, self-cleansing. Also, many teeth are of so hard and dense a structure that they do not require such care in cleaning as would render separations or shapings necessary. But all teeth not dense in structure, or which show an early tendency to decay, and thus indicate that very great care should be used to keep them clear on all sides, I would treat so that such cleaning would be a work of facility. Then, this kind of treatment has another and most important consideration, which we need not now allude to, but which is included in the idea of thorough cleanliness. Some will say that the cutting away of the enamel will render the teeth sensitive and more liable to decay. But it is rarely required to go through the enamel to secure the end aimed at; and it is found also that sound teeth never decay through the breaking off or cutting away of enamel if the surfaces are kept clean.

I strongly recommend the use of floss silk and toothpicks, with very vigorous rinsing of the mouth, to keep teeth clean, rather than the brush. The water for rinsing should be tepid, and *flavored* with cider vinegar, which makes a simple and pleasant astringent and detergent mouth-wash. As a dentifrice I recommend "Shand's Perfumed Velvet Chalk," a preparation made into balls, and boxed up, each ball filling its box. I crack or split the ball into pieces of a size fit to be taken in the fingers and carried to the mouth, when a piece the size of a pea or bean should be broken or bitten off, and softened into a pulpy mass by the saliva. The brush, *not* wetted, should be rubbed on castile soap, and the pulpy mass of chalk then deposited on it with the lips and tongue, when the teeth may be rubbed with the whole in the manner best calculated to reach those surfaces most likely to decay. By allowing the brush (which should not be hard), charged with soap and chalk, to be wet only by the viscid saliva, the chalk does not become uselessly diffused about the mouth, as it would were the brush dipped in water.

Adjourned.

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The second regular meeting of this society was held at the residence of Dr. Daniel Neall, 1627 Summer Street, on Saturday evening, March 1, 1879.

President, Dr. Daniel Neall, in the chair.

The following essay was read by Dr. Charles J. Essig on

AMALGAMS.

The name given to any alloy of mercury and another metal. The amalgams form a very numerous class of compounds, and many of them are largely used in the arts.

Some of the amalgams are formed by direct contact of the metals, with evolution of heat; others are obtained by the action of mercury on a salt of the metal, or the action of the metal on a salt of mercury, assisted by the passage of a weak electric current in some cases.

Some amalgams are solid, others liquid. They are, generally speaking, weak compounds, many of them being decomposed by pressure, and all at high temperatures. Alloys for dental amalgams should possess the qualities of strength and sharpness of edge, and freedom from admixture with any metal capable of forming soluble salts of an injurious character in the mouth. It should also be capable of maintaining its color, although in an alloy composed of several different metals absolute freedom from discoloration, under the conditions to which an amalgam filling is exposed, cannot readily be obtained. It should also be capable of retaining its shape, as the tendency on the part of many amalgams to assume a globular form after their introduction, thus leaving the edges of the cavity unprotected, is probably a prolific cause of failure in this class of fillings. Undue expansion, although not so likely to occur as some other conditions, would be equally a source of failure. According to Mr. Fletcher, amalgams of silver and mercury alone expand sometimes sufficiently to split a tooth, and Mr. Kirby states "that amalgams of pure silver, either the precipitate or filings, expand greatly;" with a suitable instrument for measuring he was able to determine the change in bulk of such an amalgam, in which he found the extent of expansion to reach one-fortieth of its diameter. Many old amalgam fillings have the appearance of projecting from the edges of the cavity, as though there existed some force behind or under sufficient to push them out. There seems to be some diversity of opinion respecting the cause of this, and, while it has been attributed to expansion, others have believed it to be due to the opposite condition. Favoring the latter theory, Mr. Fletcher states that he has found it only with those amalgams which are known to shrink, and he suggests that the plug may be raised, or forced out, by the "decomposition of tooth-substance and formation of gas under the loosened plug, the driving down and accumulation of food underneath, or some similar cause." It is evident that an amalgam possessing to a marked extent either property is not to be relied upon as a filling material, and both may cause the condition above referred to.

Discoloration of dental amalgams depends largely upon the formation of sulphides. The fluids of the mouth, in every case where the most scrupulous cleanliness is not observed, may be said to contain sulphur in combination with hydrogen, as dihydric-sulphide (H_2S), resulting from decomposition of particles of food lodging between and adhering to the teeth. The affinity of sulphur for both silver and mercury is so active, that we may reasonably assume that not only the discoloration of amalgam fillings, but in many cases their failure to prevent a recurrence of decay, is due to the action of that element upon the alloy. Neither is it safe, in compounding alloys for dental amalgams, to depend upon the protecting influence of metals which do not possess the same affinities, such as gold and platinum, for while these metals individually may remain wholly unaffected by contact with sulphur, it does not necessarily follow that their presence in an alloy will confer the same immunity upon such as silver and mercury. Indeed, the reverse of this may take place; and those which are totally insoluble in certain menstrua may be rendered soluble in them, by the addition of a metal on which they have the power of acting. In this way platinum, although of itself invulnerable to nitric acid, may be dissolved by it when sufficiently alloyed with silver. There are doubtless other causes for the discoloration of amalgams, some of them purely adventitious, depending upon the administration of certain remedies in disease, abnormal conditions of the fluids of the mouth, or the presence of vegetable acids in articles of food.

An amalgam filling may retain its integrity of surface, while at the same time the darkening of the tooth-substance unmistakably indicates chemical action at its peripheral portion, due to imperfect adaptation favoring the ingress of the eroding agent. It appears that almost any amalgam filling may be kept bright by attrition, whether of the brush or in mastication, and it seems equally certain that all amalgams will blacken, if the position which the filling occupies protects it entirely from friction. Again, an amalgam filling may retain its original color and brightness of surface, and yet not protect the tooth; and, conversely, a filling of this class may exhibit a great degree of surface discoloration, and yet fully preserve the tooth from further decay, peripheral discoloration being much the worse condition of the two.

In a number of experiments which I made with some of the well-known amalgams, such as Townsend's, Arrington's, "Standard Alloy," Lawrence's, Walker's, etc., as well as with some of a higher grade of my own compounding, consisting of gold, silver, tin, and platinum, I found that, with care in using the proper quantity of mercury and in packing the mass into clean glass tubes, which were then filled with colored fluid and closely sealed, apparently, after several weeks, not the slightest leakage occurred, and yet, when the same tubes were thrown into a solution of sulphureted hydrogen, the edges were attacked, and marked discoloration occurred, while the surface directly exposed to the action of the sulphur, and not in contact with the glass, was but slightly clouded. The edges had the appearance of having been eroded as by an acid. This experiment is not merely speculative, since it simply consists in filling a cavity with amalgam, and then exposing it to sulphur in the form usually found in the mouth. The result is precisely similar to that which is observed in the great majority of amalgam fillings in actual service. It would seem, however, that the purely theoretical test of covering the plug with colored fluid, such as indigo, blue ink, etc., known as the "color test," is not to be relied upon in testing peripheral adaptation, for all the plugs used in this experiment had, apparently, excluded the passage of the coloring fluid. Yet that they did not perfectly seal the tubes, although introduced under very favorable conditions, was abundantly shown by the result, which plainly indicated that solution of one or more of the constituents of the alloy had taken place, resulting in the formation of new compounds, consisting of sulphides of silver and mercury, and in some instances probably of copper.

Properties conferred by the different metals usually present as constituents of amalgams.—*Tin* dissolves very easily in mercury, but it hardens slowly and imperfectly. Without admixture with other metals it is unfit for use in the mouth. It is also well known to possess a tendency to draw away from the edges of any cavity into which it may be packed, and to assume a globular form. It never becomes sufficiently hard to answer the requirements of a filling material. Mixed with other metals, tin serves as a vehicle by which amalgamation is facilitated and different degrees of plasticity obtained. For example, between mercury and silver these phenomena are more slowly manifested; by the addition of tin, however, both properties are easily attained.

Silver, apparently, unites very readily with mercury, yet it will be found, upon close examination, that complete solution of pure silver filings does not take place until after some weeks of contact, unless the silver, in a finely-divided state, be added to heated mercury, when amalgamation will be more readily accomplished. Amalgams of silver and mercury alone are said to expand. Silver, with tin added, yields an alloy very white in appearance, but more easily oxidized than either of the constituents; mixed with mercury an exceedingly unctuous and plastic amalgam is obtained, but it is somewhat slow in hardening, and there is much diversity of opinion in regard to the contraction and expansion of this alloy.

Dr. Hitchcock and Mr. Tomes both claim contraction[*] for it, while Mr. Kirby states that an "amalgam consisting of an alloy of three parts of silver and two of tin contracts slightly at first, but finally expands about $\frac{1}{500}$."[†] These variable results may depend upon the quantity of mercury employed; and I am satisfied that when an alloy of silver and tin is used no excess of mercury should be present, and when this precaution has been carefully observed it has been found that the result is quite as good as those obtained with alloys of a higher grade. Thus, five hundred milligrammes of Arrington's amalgam, composed of silver, forty per cent.; tin, sixty per cent.,[‡] mixed with one hundred and sixty milligrammes of mercury, withstood the sulphureted hydrogen test quite as well as those containing gold and platinum. It should be borne in mind that alloys composed of tin and silver only require much less mercury to render them plastic than those containing additional proportions of gold and platinum.

Probably the most unfavorable condition observed in alloys of silver and tin is slowness in hardening, thus favoring the ingress of fluids by capillary force. The direct influence which silver exerts upon an amalgam of tin and mercury, when added to it, is to lessen the tendency to assume the spheroidal form, and to facilitate setting. In this respect its action is similar to that of gold; but while the latter further lessens these injurious tendencies and confers analogous properties, it cannot be made to supersede silver. In my first experiment with these curious compounds, I formed an alloy consisting of

Gold,	500	milligrammes;
Platinum,	500	"
Silver,	2000	"
Tin,	2500	"

An amalgam of this alloy hardened almost instantly, so that a filling of it might be inserted and finished at one sitting. For the sake of experiment I made another ingot, omitting the silver; the result was an exceedingly brittle alloy, which could only be made to unite with mercury by heating, and even then with difficulty, and, after many days, it had not hardened sufficiently for use as a filling material. Thus it will be seen that silver fills an important place in dental alloys, since without its presence amalgamation becomes difficult and the valuable property of rapidity in hardening is lost.

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[*] Transactions New York Odontological Society, 1874.

[†] Ibid.

[‡] Hitchcock, Ibid.

Gold combines with mercury at all temperatures, but for rapid amalgamation an elevation of temperature is required, and the process is further accelerated by a state of fine division. With mercury alone it does not harden well; added to tin, it to a certain extent facilitates setting, but does not harden sufficiently for use in the mouth. Gold prevents the tendency to draw away from the edges; but when added to an alloy of tin and silver the greatest benefit is derived from its presence. I found that an alloy consisting of

Gold,	500	milligrammes;
Silver,	2000	"
Tin,	2500	"

when mixed with mercury in the proportions of five hundred milligrammes of the alloy to two hundred and fifty milligrammes of mercury, retained its sharpness of edge, hardened well in a few minutes, and apparently filled all the requirements of a dental amalgam. I am aware that it has been stated that gold added to an alloy of tin and silver retards hardening, but I suspect this to be an error, and the presence of an *excess* of mercury the real cause.

Platinum, in the form of plate or wire, does not unite with mercury. A very smooth and plastic amalgam may, however, be formed by rubbing some finely-divided platinum, such as is obtained by precipitation, with mercury, in a heated mortar.

An amalgam composed of platinum and mercury alone does not harden well. The properties of an alloy of tin and silver are also greatly impaired by the addition of platinum. I found an alloy consisting of tin two thousand five hundred milligrammes, platinum five hundred milligrammes, to be exceedingly brittle, and with its affinity for mercury lessened to such an extent that amalgamation was only accomplished by elevation of temperature and much rubbing, while the property of setting was almost entirely lost.

Added to an alloy of gold and tin, the same negative results are observed (see *Silver*); when combined with tin, silver, and gold, however, the real value of platinum becomes apparent; with the proper amount of mercury it seems to confer upon such an alloy the property of almost instantly setting, as well as greater hardness. Thus it will be seen that the qualities claimed for platinum *per se* belong in reality to the combination of tin, silver, gold, platinum, and mercury, since if any one of the others is omitted the platinum not only remains passive, but actually, by its presence, causes marked deterioration of the qualities essential in a dental amalgam.

Alloys containing platinum amalgamate less readily than those wherefrom it is absent; yet when union has once begun, they seem to require a greater amount of mercury to render them plastic. By careful experiment I found that with an alloy of

Platinum, 500 milligrammes;
Gold, 500 "
Silver, 2000 "
Tin, 2500 "

the smallest amount of mercury which could be employed, without impairing the strength and general working qualities of the amalgam, was three hundred milligrammes of mercury to five hundred milligrammes of the alloy; while with another ingot, composed of

Gold, 500 milligrammes;
Silver, 2000 "
Tin, 2500 "

one hundred and sixty milligrammes of mercury to five hundred of the alloy afforded a perfectly good result.

The proper quantity of mercury should be ascertained by careful experiment. The statements of manufacturers or vendors are not always reliable, if we may judge from the directions accompanying one particular compound, modestly called "The Standard Alloy," in which the proportion of mercury to the alloy is given as five to six, —an amount so greatly in excess that I found, in filling a tube with a mass composed of six hundred milligrammes of the alloy with five hundred milligrammes of mercury, that more than a third of the latter was expressed with very slight force.

In order to ascertain the amount of mercury required by different alloys, a small quantity of the latter should be taken, say one gramme, and, after weighing, the mercury may be carefully added, and mixed by rubbing until the mass assumes a semi-cohesive state; it should then be weighed again, to determine accurately the amount of mercury present; and may then be introduced into a glass tube and condensed by means of instruments slightly warmed. Should the proportions not be correct, another trial may be made, and the quantity of mercury increased, or diminished, according to the result of the first experiment.

The quantity of mercury required by different alloys is probably definite, so that a tolerably accurate approximation of the composition of an alloy may be arrived at by carefully noting the required proportions of one to the other.

Different means are employed in the attainment of this object; probably the most common is to mix the alloy with a large excess of mercury, and then to express the surplus either by compression with the fingers, or through the pores of a piece of chamois-leather;

the first involves a loss of some of the alloy, which is carried away with the surplus of mercury, and neither of them is to be relied upon as a means of excluding an excess of mercury.

There are also several methods employed in mixing amalgams. Probably the most common one consists in simply rubbing the two together in the palm of the hand; this is certainly the most expeditious, though not a very neat way, and much has been said about manifestations of the physiological effect of mercury following a long continuance of the practice. I have been to considerable trouble to ascertain the correctness of this theory, and while I have met some who have attributed certain phases of ill health to absorption of mercury applied in this way, yet I have been unable to directly trace a single case of ptyalism or any other well-marked sign of mercurial poisoning to this cause. It would be well to remember, however, that the active properties of mercury are developed by a state of fine division, and there is nothing unreasonable in the belief that mercury highly comminuted by rubbing in the palm of the hand may find its way into the system and produce constitutional disturbance. In view of these facts it would be a proper precaution to prevent contact of the mercury with the skin; this may be accomplished by covering the hand with a piece of rubber dam, forming a sort of mitten, leaving the fingers free, and having an opening for the thumb to pass through.

Small porcelain mortars are also employed in amalgamation, but they do not speedily effect the desired purpose, in consequence of the granules of the alloy becoming burnished by the attrition of the pestle; heating the mortar will, however, greatly facilitate union.

Mr. Fletcher has recently called attention to a simple and effective method of mixing amalgams. The required weights of filings and mercury are put into a long, narrow test-tube, or bottle, and well shaken for a few seconds; the percussive force brought to bear upon the mass quickly promotes union.

Some difficulty may be encountered in introducing amalgam fillings where the mercury has been reduced to the minimum; the semi-coherent mass, almost in the form of a powder, is not easily introduced into the cavity, especially if it be in the superior arch, and the only way by which it can be conveyed to the cavity is by first compressing some of the powder with a warm instrument, after which it may be handled with the pliers.

Fletcher has recently devised a sort of cylinder mould by which amalgams, mixed so dry as to be unmanageable, may rapidly be shaped into a convenient workable form; it consists of a cylinder into which the semi-coherent mass is poured, and by means of a piston the powder is compressed into disks of the desired thickness, which may be introduced into the cavity and solidly compressed with slightly-warmed instruments. It is claimed that this arrangement practically does away with the chief objection to the use of very dry amalgams.

Alloys.—Most of the metals are capable of uniting with each other, forming a class of compounds termed alloys, in which may be observed, to a greater or less extent, the properties of the several constituents entering into the union.

From a purely scientific point of view the study of the alloys is an interesting one, as they are not only mixtures of metals possessing certain distinct qualities, but may also be regarded as true chemical compounds, as in the appearance which often accompanies the union of the metals and in the properties of the resulting alloys we may frequently observe the phenomena which characterize affinity, such as heat and incandescence, resulting in the formation of substances having a definite composition, distinct crystalline form, and properties differing from those of their constituents.

The tendency on the part of metals to unite in definite proportions may be studied in connection with platinum, iridium, gold, rhodium, ruthenium, and silver, when fused with tin. If the latter metal is in excess after cooling, a metallic ingot is obtained resembling closely the original substance; but by the action of strong hydrochloric acid the excess of tin may be dissolved, leaving crystals of a definite alloy of the tin and the noble metal, which cannot be further dissolved by the same acid, but are soluble in the hydrochloric acid even when the precious metal contained, whether rhodium, ruthenium, or iridium, is in the free state absolutely insoluble.

It must not, however, be assumed that all the alloys employed in the useful arts are the result of one definite combination, many being capable of co-existing in the same alloy; this accounts for the difference frequently observed in the behavior of different parts of the same ingot, and may be demonstrated in an alloy of tin, lead, and bismuth, which melts below the boiling-point of water, heated to 20° C., and then permitted to cool; it will be observed by the assistance of the thermometer that the fall of temperature is twice distinctly arrested, and the cause of this phenomenon has been assumed as due to the production in the compound of a less fusible alloy, which in solidifying evolves heat, and thus for a time retards the gradual cooling of the mass. It may therefore be assumed that true chemical combination may occur between two metals, notwithstanding the fact that such union may be masked by excess of one of the constituents.

Matthiensen, in an elaborate paper on the subject, states that "An alloy may be, 1st, a solidified solution of one metal in another; 2d, a chemical combination; 3d, a mechanical mixture; 4th, a solidified solution or mechanical mixture of two or all of the above."

Forming alloys for amalgams.—The putting together of the constituents of an alloy composed of tin, silver, gold, and platinum, is a matter of no great difficulty, as it does not require an extraordinary degree of heat, and it may easily be accomplished in a stove or furnace such as is usually employed for heating or cooking purposes; the small reverberatory furnace, recently devised by Mr. Fletcher and manufactured by the B. D. M. Co., answers very well. I have used one successfully in a large number of melting operations; and they cost but a small sum. The only difficulties likely to be met with in forming an alloy of this description are oxidation of the tin, and the formation of certain definite compounds having a tendency to separate from the mass, thus affording an ingot which is not homogeneous.

Oxidation of the tin may take place at the instant of union with the platinum when a great elevation of temperature occurs; for this reason the platinum should not be in a too finely-divided state, as a condition of minute division greatly accelerates combination, and consequently increases the intensity of the accompanying phenomena of heat, etc. A quantity of borax should be fused in the crucible before the metals are melted, the object being to prevent adhesion of the alloy to the sides, to facilitate pouring, and to dissolve and hold in solution any oxide which may be present. Lastly, a layer of broken charcoal should be placed over the mass before heating; this will perfectly protect it from oxidation.

The formation of definite alloys, it has been shown, takes place with the gradual cooling of the mass, the fusing-point and density of these being greater than that which remains fluid. They manifest a tendency to settle to the bottom of the crucible in a solid state, and in some cases do not leave the crucible in pouring; thus the ingot may not possess the desired composition. Again, they may assume a semisolid form, floating in masses in the more fluid portion, and setting at the moment of pouring at the bottom or sides of the mould, the result yielding an ingot which is not uniform in composition. In consequence of this it has been recommended that different parts of every ingot should be tested; but this difficulty may be entirely avoided by carrying the heat to a point of complete fusion, and pouring while still very hot, before the tendency to separate begins.

Oxidation of the surface from contact with the atmosphere will retard amalgamation. It is therefore better not to reduce the entire ingot to a state of fine division. It will be found to unite more readily with the mercury if freshly filed off as required for use; this can easily be effected with one of the coarse files sold at the depots as vulcanite files. Other metals, such as palladium, copper, cadmium, bismuth, antimony, and even zinc, have been used as constituents of amalgams. The four latter are of but little value, and some of them are liable to be converted into salts of a deleterious nature. Palladium confers similar properties to those obtained by the addition of platinum; but it is a rare and expensive metal, and is probably in no respect superior, as an ingredient in dental alloys, to platinum.

Copper is said to control shrinkage while it increases the tendency to discoloration. Most dentists would hesitate about employing an amalgam known to contain copper; yet I was much surprised recently at the result of a careful analysis of an amalgam filling which had done good service for twenty-three years, during which period it had retained a perfectly bright and smooth surface exteriorly. Having become loose by the fracture of a portion of the tooth, involving one retaining wall, in consequence of the gradual softening of the dentine, the patient brought it to me, and I found its composition (after freeing from mercury) to be tin, 55 parts; silver, 40 parts; copper, 5 parts.

Brittleness may be increased or diminished according to the quantity of platinum present, and the resulting amalgam will exhibit this quality equally with the alloy. An amalgam filling should always be strong enough to retain its integrity of edge under the force of mastication. The formula from which I have obtained very good results is as follows:

Silver,	40	grammes;
Tin,	60	"
Gold,	3	"
Platinum,	3	"

Larger percentages of gold and platinum afford no better results, but, on the contrary, the alloy is rendered more brittle thereby; its affinity for mercury is lessened, while its capacity for the latter is increased, as shown under the head of *Platinum*.

Discussion.

Dr. Darby. Dr. Essig has failed in his essay to refer to the proper method of alloying the metals, and much depends upon this. The silver should be melted first, and when at a boiling heat the platinum should be added in very small particles,—either rolled into thin ribbons or cut into minute pieces. Next, the gold should be added, and lastly the tin. When the mass is thoroughly melted, it should be well stirred, and immediately poured into the ingot mould. If this method is not followed there is danger of the platinum falling to the bottom of the crucible, and it will be found that the alloy is minus the platinum.

Dr. Essig. Dr. Darby refers to the putting together of the metals. Between tin and the metals of the platinum group strong affinity exists, and when melted together tin and platinum combine with such avidity that incandescence accompanies the union, and it is only necessary to expose the two under favorable condition to a temperature of 600° F. The platinum does not settle to the bottom of the crucible in consequence of its greater specific gravity; that appearance is probably due to the formation of alloys of definite proportions as the mass cools. The way to avoid this trouble is to pour the alloy while still very hot, and before these formations take place. There will be no oxidation of the alloy if kept covered with fine charcoal during melting. I am using an alloy composed of tin, 3 oz.; silver, 2½ oz.; platinum, 2½ dwts.; gold, 2½ dwts. (Dr. Essig presented several specimens of exceedingly hard amalgams in glass tubes, the hardest of which, he said, was composed of silver, gold, platinum, and tin.)

Dr. Tees. For the past eleven years I have experimented a great deal with these alloys for amalgam, and I have found that good results can be obtained with silver and tin alone. Dr. Flagg told the proprietors of one of the dental depots that Townsend's amalgam, composed of five parts of tin to four parts of silver, was as good as any. A quick-setting amalgam may be made from an alloy of four parts of silver to three parts of tin; but it makes a filling of a darker color than one made from an alloy in which tin is in excess. For many years I used an alloy composed of five parts of silver to three parts of tin. About seven years ago I filled for one of my patients several very large cavities with amalgam of this alloy; the fillings are still in good condition and of a fair color. For the past three or four years I have been using an alloy composed of 40 dwts. of tin (chemically pure); 24 dwts. of silver (chemically pure); 1 dwt. of platinum filings.

I place the silver and the platinum filings together in a crucible, with a small lump of borax, and melt in a hot coke fire. Like Dr. Darby, I allow them to boil for fifteen or twenty minutes. I then melt the tin in another crucible and pour the boiling silver and platinum into it, and immediately pour the mass into an ingot mould.

It has been recently asserted that the platinum in the alloy does not unite chemically with the other metals, but having a mechanical union only, is lost with the oxide in the process of amalgamation. As a proof that this is not so, we find that an amalgam filling, formed from an alloy in which platinum is a constituent, is of a different character from one of the same proportion of the other metals, but containing no platinum.

In regard to ptyalism or other constitutional disturbances being produced by mixing the amalgam in the palm of the hand, I must say that I have been mixing it in this way for many years, and almost daily for the past ten years, and still I am enjoying excellent health.

Dr. Kingsbury. In 1838, when I first used amalgam, it was prepared by filing the ordinary silver coin and amalgamating it with crude mercury. The result was a somewhat granular but very hard amalgam, that soon became dark-colored from oxidation. The proportion of copper in the silver coin doubtless increased its tendency to oxidize. After a time a portion of tin foil was added to the amalgam, which was regarded as an improvement, although the coin and the tin were not melted together as now to form an alloy previous to filing and amalgamating with the mercury. The first fillings of this kind that I ever saw were in the mouth of a clergyman, and in the proximate surfaces of the inferior incisors, which were badly decayed. The fillings were quite dark-colored and unsightly; yet the patient appeared much pleased with them.

For two or three years I used amalgam in filling badly decayed teeth, and with great satisfaction to my patients. Some prominent dentists took strong grounds against the use of it, alleging that it produced ptyalism in some cases. Some fatal cases were reported (notably one that occurred in Springfield, Mass.) as resulting from its use, and a strong prejudice was created against it. My judgment was overruled by the older practitioners and I abandoned it altogether, and did not use it again until the amalgam war was ended, and a revolution or change of sentiment took place in favor of its use in special cases. I have used it to a limited extent in my practice ever since. I believe it to be valuable as a filling material when used with proper care and discrimination.

Since my residence in this city I have used a variety of amalgams,—more of Townsend's and Arrington's probably than any other. In conversation with Dr. Flagg recently on the relative merits of the different amalgams in use, he remarked that from his experience and the special attention he had given the subject he was led to believe that the old amalgam made from silver coin, with its small proportion of copper, so far as its chemical constituents are concerned, was just about what was needed.

Dr. Atkinson, of New York. I do not know that I can add anything to what has already been said, except to suggest that the alloy, while in a state of fusion, should be poured into a tank of water, and afterwards, if necessary, remelted and poured into an ingot mould. I would not criticise the rest of the paper without being sure that I thoroughly understood it. Those who opposed the use of amalgam without reason, accepted it at last after the persistent efforts of those who strove after the truth; but these are not the ones who should lead the world. Experimentation is what is necessary.

Dr. D. Neall. May I ask Dr. Atkinson what the theory of the action of amalgam upon the teeth is?

Dr. Atkinson. Teeth are rendered calcified by it, so that after a filling falls out the tooth is saved by the deposits of lime-salts from the fibrin in the tubules. I have never seen this excessive hardening under gold.

Ambler Tees, D.D.S., A.M.,
Recording Secretary.

FIRST DISTRICT DENTAL SOCIETY.

At the annual meeting of the First District Dental Society of the State of New York, held in the city of New York, April 1, 1879, the following gentlemen were elected officers for the ensuing year:

President.—Dr. C. E. Francis.
Vice-President.—Dr. J. W. Clowes.
Secretary.—Dr. G. W. Weld.
Treasurer.—Dr. Chas. Miller.
Executive Committee.—Dr. Chas. Miller, Dr. A. L. Northrop, Dr. C. A. Woodward.

G. W. Weld, *Secretary.*

INDIANA STATE DENTAL ASSOCIATION.

The twenty-first annual session of the Indiana State Dental Association will be held in Wright's Hall, 68½ East Market Street, Indianapolis, commencing Tuesday, June 24, 1879, at ten o'clock. A large attendance is expected.

J. A. Turner, *Secretary.*

GEORGIA STATE DENTAL SOCIETY.

The eleventh annual session of the Georgia State Dental Society will be held in the city of Augusta, Ga., on Tuesday, the 8th of July next, at ten o'clock A.M.

The State Board of Dental Examiners meet at the same time and place.

L. D. Carpenter,
Corresponding Secretary.

WISCONSIN STATE DENTAL SOCIETY.

The Wisconsin State Dental Society will hold its eighth annual meeting for 1879 in Milwaukee, Wisconsin, on the 15th, 16th, and 17th of July. A general invitation is extended to the dental profession, with a strong hope that many will make it convenient to be present.

W. H. Chilson,
Chairman of the Executive Committee.

NATIONAL DENTAL ASSOCIATION.

The eleventh annual meeting of this association (late "Southern") will be held in Augusta, Ga., commencing July 8, 1879, at ten A.M.

It is expected that the members of the different standing committees will promptly attend to their duties. A cordial invitation is extended to the dental profession generally. The Georgia, South Carolina, and North Carolina State Dental Societies are expected to be present at this meeting.

Officers:

President.—Professor F. J. S. Gorgas, Baltimore, Md.
First Vice-President.—Dr. L. D. Carpenter, Atlanta, Ga.
Second Vice-President.—Dr. J. R. Walker, New Orleans, La.
Third Vice-President.—Dr. John G. Wayt, Richmond, Va.
Corresponding Secretary.—Dr. A. C. Ford, Atlanta, Ga.
Recording Secretary.—Dr. E. S. Chisolm, Tuscaloosa, Ala.
Treasurer.—Dr. H. A. Lowrance, Athens, Ga.
Executive Committee.—Drs. W. C. Wardlaw, Augusta, Ga.; George H. Winkler, Augusta, Ga.; G. W. H. Whitaker, Sandersville, Ga.

NORTH CAROLINA STATE DENTAL ASSOCIATION.

The North Carolina State Dental Association will hold its fifth annual communication in the city of Raleigh, commencing Tuesday, the first day of July, 1879, and continuing four days. A cordial invitation is extended to all interested.

W. H. Hoffman, *Secretary.*

PENNSYLVANIA STATE DENTAL SOCIETY.

The eleventh annual meeting of this society will convene at the Water Gap House, Delaware Water Gap, Monroe County, Pa., Tuesday, July 29, 1879, at ten o'clock A.M.

The subjects for essays and discussions will be published hereafter. Dentists having cases suitable for surgical clinics will please inform the executive committee at once. Persons having improvements or inventions of interest to the profession will please notify the committee, who will make proper arrangements to have them exhibited. The hotel rates to persons attending the society have been reduced to two dollars and seventy-five cents per day.

C. S. Beck,
Chairman Executive Committee, Wilkesbarre, Pa.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

The Pennsylvania State Dental Examining Board will hold its annual meeting for the examination of applicants at Delaware Water Gap during the session of the State Dental Society, which convenes Tuesday, July 29, 1879.

Applicants will be required to show specimens of work in both the operative and mechanical departments.

C. N. Peirce, *Chairman.*

NOTICE.

The Board of Examiners of the New Jersey State Dental Society will meet at the Ocean House, Long Branch, Tuesday, July 15, at two o'clock P.M. All persons desiring to commence the practice of dentistry, or who are now practicing contrary to the law of the State, will please report to the undersigned and be in attendance at the meeting of the examiners.

C. S. Stockton, *Secretary,*
Newark, N. J.

EDITORIAL.

EXTRA PAGES—APOLOGY.

In consequence of the accumulation of original contributions, etc., we have added eight pages (making sixty-four) of reading matter to this issue. The number for March also contained eight extra pages. Notwithstanding this effort to dispose of the matter on hand we have been compelled to lay over much already in type, for which we must ask the indulgence of contributors.

SALE OF DR. McQUILLEN'S MODELS AND PREPARATIONS.

M. Thomas & Sons, auctioneers, will offer for sale at the Philadelphia Dental College, on Monday, June 16, at ten o'clock, the property of the late Prof. McQuillen, consisting of manikin, *papier-maché* models, etc., used by him in his lectures. Catalogues can be obtained on application to this office.

OBITUARY.

DR. CHARLES C. ALLEN.

Died at Great Bend, Pennsylvania, December 12, 1877, Dr. Charles C. Allen.

Dr. Allen studied dentistry with Dr. William H. Allen, of New York, and was a graduate of the New York College of Dentistry. The notice of Dr. Allen's decease is published at this late day by request.

THE DEATH OF JOSIAH BACON.

Josiah Bacon, Treasurer of the Goodyear Dental Vulcanite Company, was found dead on the floor of his room at the Baldwin Hotel, San Francisco, Cal., Sunday, April 13, 1879, with a pistol-shot wound in his abdomen. When the body was discovered he had been dead for several hours. It was not clear at first whether Mr. Bacon came to his death by his own hand or by that of another. Subsequently, Dr. Samuel P. Chalfant, a dentist of San Francisco, delivered himself up to the authorities, admitting that the fatal shot had been fired by him, but claiming that it was accidental. He has been indicted by the grand jury, and will have to stand trial on the charge of murder.

VULCANITE LITIGATION.

In the Dental Cosmos for January, 1874, there was printed for the information of the dental profession and as an element of the history of the Cummings patent litigation, a notice served on the undersigned of an action brought against him in the Circuit Court of the United States for the Southern District of New York, by the Goodyear Dental Vulcanite Co., "in a plea of trespass on the case to the damage of the plaintiff of one hundred thousand dollars." The cause of action is called in the declaration "maintenance," and is based upon our efforts, made in response to the repeated requests of a large number of dentists and dental societies, and as their representative, and in the assertion of our own interests, with but one object in view, viz., to complete and present for adjudication a *test case*, the final decision of which should determine the questions between the Goodyear Dental Vulcanite Company and the public.

In the Dental Cosmos for April, 1874, in announcing that the plaintiff's declaration had been filed, we stated that we would report the further progress of the case, which we now do, as follows:

On the 6th December, 1873, the action was commenced. On the 7th February, 1874, the declaration was filed. Our counsel interposed demurrers to each of the three counts of the declaration. The demurrers were argued before the late Circuit Judge Lewis B. Woodruff, on the 3d day of December, 1874, who sustained the demurrers in an opinion, as follows:

"I am of opinion that the first count contains no sufficient cause of action; that the second and third counts are defective in not averring that any suits were begun the defense of which the defendant did or could unjustly or unlawfully maintain. Demurrer sustained, but with leave to plaintiff to amend on the usual terms."

The plaintiff thereupon filed an amended declaration on the 17th December, 1874.

In March, 1875, the plaintiff commenced another action against Samuel S. White, for slander of the plaintiff's title to the Cummings patent, and laid its damages at seventy-five thousand dollars. This was based upon words used in the DENTAL COSMOS in publications contained in it. The action was brought in the Supreme Court of the State of New York. The defendant appeared in the action and the cause was ready for argument upon demurrer, when in October, 1875, the plaintiff removed the cause to the United States Circuit Court for the Southern District of New York, so that the two actions were thenceforth continued in the United States Court, and at issue upon demurrer.

The following proceedings have reference only to the slander suit:

On the 4th April, 1876, the demurrer was argued before the late Judge Alexander S. Johnson, but before he was able to examine the case he died. On the 25th May, 1878, the demurrer was argued before Hon. S. Blatchford, Circuit Judge. He overruled the demurrer. In January, 1879, he made an order that the plaintiff show cause why the defendant should not have leave to amend and serve a new answer. After several delays in the hearing of the motion cause was shown, and the court gave leave to put in an amended answer; and subsequently a motion still further to amend was ordered to be heard upon a day hereafter to be fixed.

That our readers may fully understand the object and importance of the REQUEST THAT CONCLUDES THIS STATEMENT, we will explain the substance of the Goodyear Dental Vulcanite Company's allegation in the "slander suit."

Its bill of complaint sworn to March 20, 1875, avers that "the defendant, well knowing that the plaintiff was then offering for sale and was about to offer for sale licenses or office-rights to dentists to use said invention under said letters patent, and maliciously contriving to cause it to be suspected that the plaintiff was not the lawful owner of the exclusive rights secured by said letters patent, and could not lawfully sell licenses to use said invention, and could not lawfully compel the payment of royalties for the use of the invention covered by said patent, and to prevent the plaintiff from effecting sales of licenses or office-rights as aforesaid to dentists for the use of said invention, did maliciously publish in said DENTAL COSMOS, in the number thereof for"———, "at said Philadelphia, the false and defamatory matter following, to wit:" Here follow extracts from the DENTAL COSMOS for December, 1871, January, March, and June, 1872, which the plaintiff claims were libelous, and the declaration contains the following averment:

"By reason of which said several false and defamatory publications, great numbers of dentists, and particularly the persons mentioned in Schedule A hereto annexed, were dissuaded from purchasing said licenses, and refused and still refuse to purchase the said in consequence thereof:

"Wherefore, the plaintiff saith, that it is injured and has sustained damage to the value of seventy-five thousand dollars, and demands judgment against said defendant, Samuel S. White, for the said sum of seventy-five thousand dollars, besides the costs of this action."

The "Schedule A" referred to is a list of 1480 names, located in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, District of Columbia, Virginia, West Virginia, Ohio, Indiana, Illinois, Michigan, Iowa, Wisconsin, Minnesota, Missouri, Nebraska, Kansas, Kentucky, Tennessee, North and South Carolina, Georgia, Alabama, Florida, Arkansas, Mississippi, Louisiana, Texas, Colorado, and California.

This statement, substantially alleging that during the period beginning December, 1871, and ending February, 1875, all these persons were adversely influenced by the quoted publications, can best be met by evidence furnished by the Goodyear Dental Vulcanite Company itself, in its printed LISTS OF LICENSEES, which it published annually for each State, and sent to its licensees.

We have already received a number of these lists, which include as under injunction, or as under suit for injunction, or as agreeing not to use rubber, many of those claimed to have been adversely influenced, who "were dissuaded from purchasing said licenses, and refused and still refuse to purchase the said in consequence thereof." These lists also show that many of those named in Schedule A were actually licensed during the period above stated.

We therefore make this general request to our friends in the profession, to collect and send us every copy of these lists they can find, from 1871 to 1875 inclusive. The kindness will be duly appreciated and acknowledged.

SAMUEL S. WHITE.

THE

DENTAL COSMOS.

VOL. XXI. PHILADELPHIA, JULY, 1879. No. 7.

ORIGINAL COMMUNICATIONS.

ON SECONDARY DENTINE.

BY C. F. W. BÖDECKER, D.D.S., M.D.S., NEW YORK.

In volume xx. of the DENTAL COSMOS I gave a description of the minute structure of the hard tissues of the teeth, without consideration of their macroscopical relations to each other. It is generally acknowledged that the main portion of a tooth is composed of dentine, which on the crown is covered by enamel. The latter is thickest around the cusps, and becomes thinner the nearer to the neck. On the root the dentine is covered by cementum, which is thinnest about the neck, and thickest on the apex of the root.

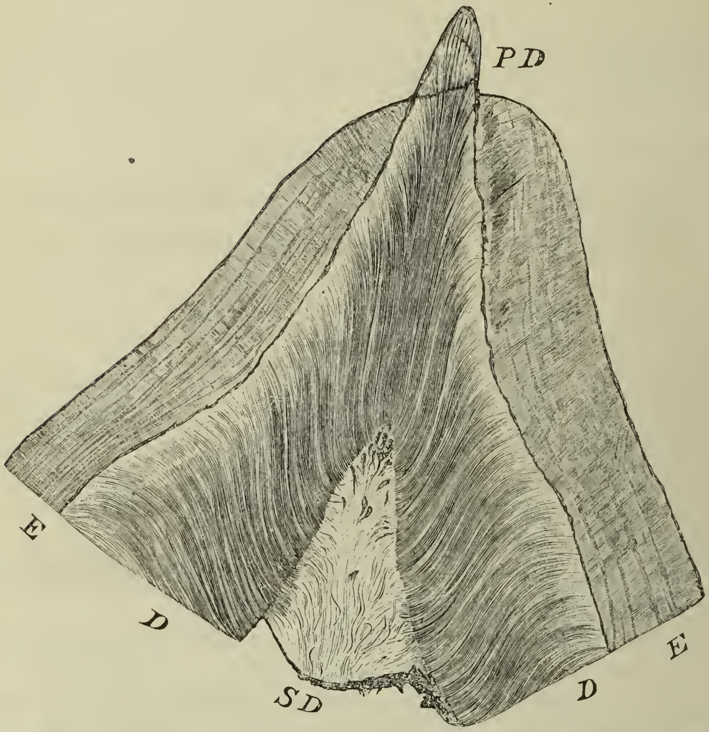
Exceptionally the relations between the three hard tissues of a tooth may be found to deviate considerably from the general rule, whereby an anomalous, though not strictly pathological, formation is produced. The history of development is not as yet sufficiently known to allow of conclusions as to disturbances in the nutrition of the dental tissues during their growth, both intra- and extra-uterine, and as the causes of such anomalies are unknown, we must be content with a description of the bare facts.

I extracted the canine teeth from the upper jaw of a lady forty years of age, one of which I split to obtain the pulp; the other was ground thin immediately after its extraction, for the purpose of studying enamel. Only one longitudinal section could be prepared. The results were as follows:

The crown was built up by dentine terminating in the ordinary pointed way, and surrounded by a well-developed cap of enamel, the outermost point of which was lost, evidently by grinding (Fig. 1, *PD*). A marked brown discoloration in the usual fan-like arrangement is noticeable in the enamel, mainly in the immediate neighborhood of the dentine, but without any decay.

The dentine, beginning at the neck and extending down into the root, is divided into a broad inner portion, occupying four-fifths of the root, and a narrow outer portion all around, corresponding in its thickness to that of the cementum of normal teeth. These two layers

Fig. 1.



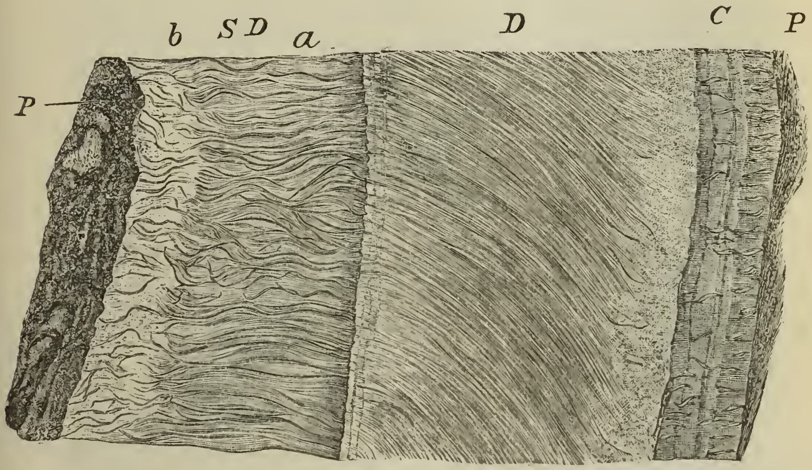
Section of the crown of an anomalous upper canine tooth. *D*, *D*, dentine; *PD*, point of dentine; *E*, *E*, enamel; *SD*, secondary dentine. Magnified 50 diameters.

of dentine are sharply marked by the difference in the carmine stain, the inner portion being very pale, the outer deeply colored. The boundary between these two layers is everywhere well defined by a scalloped line, the concavities of which look outward. On some places several such scalloped marks run perfectly parallel, close to each other. The boundary-line, however, is traversed by the dentinal canaliculi and their tenants without change of direction. The outermost portion of the dentine of the root is surrounded by cementum, not thicker than is seen on the necks of teeth of normal development. In this layer faint parallel striations are recognizable, therefore an indistinct lamellation. The cementum is slightly thicker on one side of the apex of the root, exhibiting there a scanty number of cement-corpuscles, which on all other portions are wanting.

The minute structure of the cementum is identical with that of the neck of a normal tooth,—built up by delicate wavy spindles with narrow interstices. These spindles are missing only on that side of the root where, as mentioned, cement-corpuscles are present and the basis-substance exhibits a relatively coarse granulation.

The boundary between dentine and cementum is sharply defined. The former bears the characteristics of dentine in the vicinity of the neck, as the canaliculi stop short of its surface and are replaced by a coarsely granular basis-substance. Fig. 2, taken from the lower portion of the root, illustrates the relations just described. Nearest to the pulp-chamber there is a zone (*SD b*) with scanty and irregular dentinal canaliculi, formations which we are accustomed to call "secondary dentine." Next to this is a broader layer of dentine (*SD a*), in which the dentinal canaliculi run in bundles and in a slightly irregular wavy course. Then we see a broad portion of fully developed dentine (*D*), the canaliculi of which do not reach the cementum, but beneath the latter are replaced by a coarsely granular network. The scalloped boundary between *SD* and *D* is plainly marked. On the outer surface appears the relatively narrow layer of cementum (*C*) with its lamellated structure, and attached to this remnants of the pericementum (*P*) are visible. Higher magnifying powers of the microscope give an insight into the minute structure of the dentine and cementum (see Fig. 3) taken from the place just described. In the layer of dentine (*D*), the terminations of the dentinal fibers are seen bifurcated, and leading towards the light reticulum, in which we assume the presence of living matter. The lamellated cementum (*C*) is provided with a number of curved

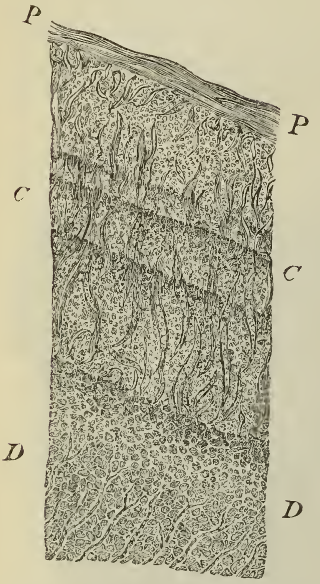
FIG. 2.



Section of root near apex of an anomalous canine tooth. *D*, dentine; *SD a*, first zone of secondary dentine; *SD b*, second zone of secondary dentine, with a portion of pulp. *C*, cementum. *P*, pericementum. Magnified 300 diameters.

spindles, evidently of protoplasmic nature, which in their general direction correspond to the course of the dentinal fibers, while the basis-substance between the spindles appears finely granular. On that portion of the cementum of the root which is provided with cement corpuscles a distinct boundary between dentine and cementum is wanting. The pericementum (Fig. 3, *P*) everywhere is attached to the cementum by rows of spindle-shaped bodies in the same manner in which we see it on the necks of normal teeth.

Fig. 3.

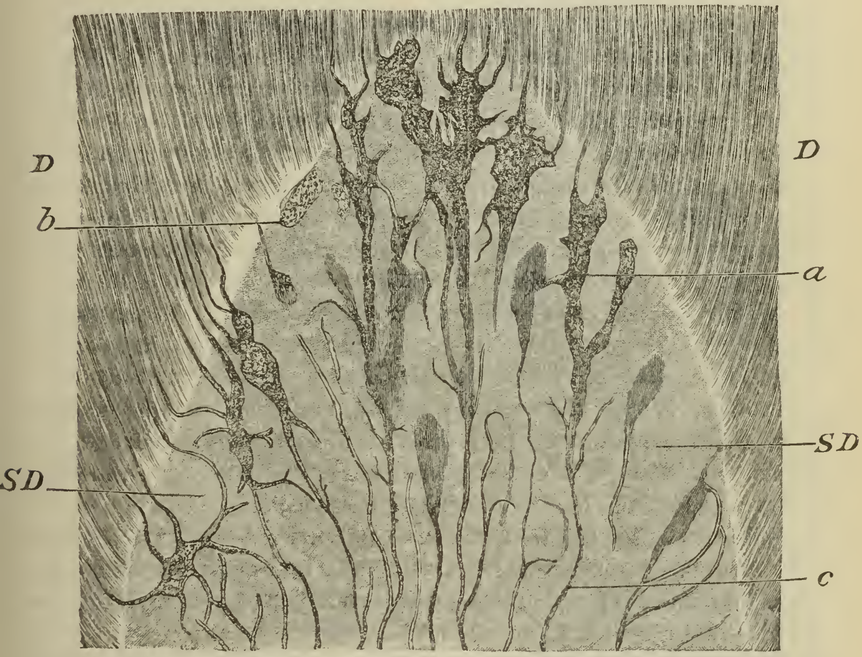


Section of root, same as Fig. 2. *D*, *D*, dentine; *C*, *C*, cementum; *P*, *P*, pericementum. Magnified 1000 diameters.

In this tooth, therefore, the cement layer is replaced by a regularly developed layer of dentine, the former being very thin, and, with the exception of a limited portion, devoid of cement-corpuscles. Evidently this tooth originally has had a very large pulp-chamber, which, with advancing age, was reduced by the formation of dentine, first regularly, and afterwards irregularly provided with dentinal canaliculi. The central portion of the dentine is occupied by a formation known under the term "secondary dentine."

In the crown a conical portion, the blunt lower end of which binds the pulp-cavity (see Fig. 1, *SD*), exhibits a structure which doubtless has all the essential properties of dentine, though in a considerably more irregular arrangement than ordinary dentine. The regular dentine terminates almost abruptly all around the cone of the irregular dentine. On the apex of the latter large, irregularly shaped, branching spaces are visible, which invariably contain partly nucleated protoplasmic formations. (See Fig. 4, *a*, *b*.) The spaces, and respectively their tenants, the protoplasmic bodies, are mainly pear-shaped, with their bases directed towards the regular dentine, with their elongations passing into the irregular dentine. From the broad bases arise numerous conical offshoots, by means of which a direct communication is established with the dentinal fibers of the regular dentine, while other offshoots inosculate with analogous formations on the apex, thus producing a coarse network. From the pointed lower ends of the pear-shaped spaces wavy canaliculi originate, which freely anastomose with each other, and traverse the whole mass of the central portion of the crown in a prevailing radiate arrangement. Their number is more scanty than in the regular dentine, so much so that relatively large territories of the basis-substance are altogether devoid of canaliculi. The latter hold delicate beaded fibers of living matter, as well as the canaliculi of normal dentine, with the exception that on the average the fibers of normal dentine are finer than those of the secondary formation. Some of these fibers are provided with lateral conical offshoots, directed towards the basis-substance, which itself shows a delicate reticular structure of essentially the same character as I have seen in regular dentine.

FIG. 4.



Same as Fig. 1. *D*, *D*, dentine; *SD*, secondary dentine; *a*, pear-shaped protoplasmic bodies on the boundary between primary and secondary dentine, sending large offshoots, *c*, downward; *b*, protoplasmic body without offshoots. Magnified 500 diameters.

The middle portion of the pulp-cavity is bounded by a narrow zone of dentine, which is possessed of canaliculi in a smaller number than the main mass of dentine. This zone, besides, is characterized by a deep carmine stain, while the regular dentine remained almost unstained. The stained portion is inserted upon the regular dentine by means of numerous shallow excavations, and its surface is irregularly jagged towards the pulp-cavity. In the apex of the root the irregular formation of dentine again is much thicker than in the middle portion, and provided with numerous roundish spaces, all of which contain protoplasm, and communicate with the irregular, wavy canaliculi of the boundary layer of the pulp-cavity.

In the tooth just described we have a formation which is known by the term "secondary dentine." The literature of this subject is concisely presented in "The Pathology of the Teeth," by Carl Wedl, Philadelphia, 1872, from which I quote the following note:

"J. Hunter (Nat. History of the Teeth), . . . in teeth which are worn away by attrition, that portion of the pulp-cavity adjacent to the abraded surface becomes filled with a new substance, which occupies the center of the abraded surface, and generally is softer than the rest of the tissue of the tooth. Prochaska (Adnotat. Academ. Prag, 1780) treated of the same subject in his 'Observat. Anatom. de Decremento Dentium Corp. Humani.' Oudet (Dictionnaire de Médecine, article Dent, 1835) gives a good description of these new formations, which he divides into two classes,—the adherent and unattached. He paid no attention to their histological structure. . . . R. Owen (Odontography) illustrates numerous new formations of osteo-dentine, but does not go very deeply into the subject. Salter (Guy's Hospital Reports, ix.) treats of osteo-dentinal formations in addition to simple calcifications of the pulp, calcareous granular deposits. He regards them as the result of a pathological process. We are indebted to J. Tomes (A Course of Lectures on Dental Phys. and Surgery, 1848) for their first minute anatomical description, and to F. Ulrich (Zeitschrift der k. k. Gesellschaft der Aerzte zu Wien, 1851), who distinguishes in them two kinds of tissues, a dentinoid, an osteoid, and a combination of the two. Wedl (Grundzüge der Pathol. Histologie, 1854) and Heider and Wedl (Deutsche Vierteljahrsschrift für Zahnheilkunde, 1864) give further anatomical details, and the latter endeavor to determine the mode of development of these new formations. R. Hohl (Monographie über Neubildungen der Zahnpulpe, 1868) furnishes a critical treatise, based upon independent investigations, and applies to these formations the terms odontoma, osteoma, and osteo-odontoma."

I quote from "A System of Dental Surgery," by John Tomes and Charles S. Tomes, Philadelphia, 1873, p. 307: "With the advance of age, the area of the pulp-cavity becomes gradually diminished by the slow addition of dentine to that which was formed when the tooth was in a state of active growth; and this condition is still more strongly marked in those teeth which have been worn by mastication; indeed, in some cases the cavity is almost, in others perfectly, obliterated. In either case the effect is, as respects the contraction of the cavity, general, but the local development of dentine continuous with the pre-existing tissue is very often coincident with caries. When the crown of the tooth is attacked, the pulp very commonly resumes its formative functions at a point corresponding to that towards which the disease is advancing, and adds, as it were, a patch or plate of new dentine (or secondary dentine, as it is commonly called), the tubular and inter-tubular substance of which is continuous with that of the older tissue, and thus the tubes of the two parts are continuous, although at the point of junction they are often marked by a slight dilatation."

S. James A. Salter, in his "Dental Pathology and Surgery," New York, 1875, says, "Considering secondary dentine as applicable to all the after-formations of dentine by which the pulp-cavity is diminished or obliterated, I would subdivide it into dentine of repair, dentine excrescence, and osteo-dentine. I first suggested the arrangement in the 'Guy's Hospital Reports' for 1853. Osteo-dentine and dentine excrescence are not infrequently seen in teeth that are worn, and exhibit dentine of repair. Dentine of repair, however, always forms upon that portion of the pulp-cavity next to the lesion, and is adherent and in direct structural continuity with the primary dentine, whereas osteo-dentine and dentine excrescence occur almost always first towards the extremity of the root, and the former is frequently quite detached from the remainder of the dentine."

Mr. Salter asserts against Tomes (p. 68), that "the circumstance of age, *per se*, is really not efficient for the production of secondary dentine; and the fact that the teeth which exhibit secondary dentine are usually from aged subjects is merely accidental, and dependent upon the fact that it is in them that the teeth are most worn. Dentine excrescences are little nodules of secondary dentine, occasionally found attached to the interior of the pulp-cavities of teeth which may be otherwise healthy, unassociated with injury or other disease. Osteo-dentine is a form of secondary dentine in which the tissue combines the characters both of bone and ivory. It is developed by the general conversion and intrinsic calcification of the several tissues of the pulp. It is usually vascular; it is frequently arranged in systems around vessels, like the Haversian systems in bone, and it sometimes contains true lacunæ."

(To be continued.)

EMOTIONAL PRODIGALITY.

BY C. FAYETTE TAYLOR, M.D., NEW YORK.

(Read before the New York Odontological Society, March 18, 1879.)

When the New York Odontological Society honored me with an invitation to read a paper before it on the subject of "Necrosis," I think I may assume that they did not intend to restrict me to any beaten track of thought or research; for, if they desired a *résumé* of our present knowledge of the morbid process denominated necrosis, there are many gentlemen connected with this society well able, by ability, education, and special research, to treat the subject exhaustively in its technical aspects. So I shall assume that in naming the subject they intended to make only a general suggestion of a theme, and would be quite satisfied to leave the particular line of thought to my own choosing.

Under this assumption I have determined to present some views in regard to the deleterious effects upon the bodily development and health of civilized communities of early and excessive mental activity, and to show, as I think I can, that to this cause we must look for a far larger amount of injury to special organs as well as to the frame as a whole, than we have been accustomed to do. I am quite aware that it is no new thing to attribute bodily injury to mental overwork in young and old, and the evil habits of society are constantly heavily charged with many of our ills. But the fault lies in too broad generalizations and too few intimations, even, of the specific direction from whence the evil charged has come. Hence important facts, which society acknowledges as general truths, produce small effect in changing the course of events. People go on as before, not because they do not now know, as a general fact, that mental overwork is injurious, but because they have not been informed in regard to the way in which it is injurious, and have little definite knowledge of methods for avoiding what they do not see clearly is to be especially avoided. Knowledge concerning the mind is like all other knowledge, it must be definite before it is capable of practical application. So that it often happens that persons who are perfectly aware that they are suffering in bodily health from mental overwork, in their anxiety to correct the evil, and in their ignorance in regard to its source, often take courses calculated to increase, rather than diminish, the mental strain from which they suffer.

In the first place, the mind, as a whole, may be said to be made up of several distinct parts or attributes. Some of these attributes may be active while others are at rest, and they all have very different and very independent and distinct relations to, and influence over, the bodily functions. For instance, one of the most common errors is the supposition that thinking, as distinguished from other mental activities, is the source of injury when one's health suffers from excessive mental strain; whereas mere thinking, disassociated from other mental phenomena, is one of the least likely to be in excess of the individual capacity to bear, and the least exhausting in any degree. In fact, it is unquestionably true that an active, well-trained *thinking* capacity imparts positive strength to the bodily powers, increasing both health and longevity. It isn't the *thinking* which breaks people down, but it is an excess—often an unnecessary excess—of other mental activities which works the bodily injury; and by "other mental activities" I would especially include the *emotions* as the most exhausting of all mental attributes. It is the emotion which so often accompanies thought which tires and exhausts the frame when it is supposed to be the thinking which does the injury.

A well-known professor of theology, who had several times broken down from mental overwork, once told me that he had noticed that while recovering, after a period of rest, he would arrive at a point at which he could go on with his purely intellectual work with perfect ease and facility when he could not listen to a sermon, the emotions being then brought into play, without being completely overcome and physically prostrated by it. And what is true in the case of this theological professor is true with us all,—we are not likely to be injured by purely intellectual work. It is only when the emotions are excited that the excessive drain on the bodily powers begins, to any injurious degree. This statement is confirmed by the well-known fact that cool and well-regulated dispositions are those which, as a rule, last the longest; men of even temperaments, or those who have disciplined themselves to habits of uniformity and equanimity, are those who do the largest amount of intellectual work, and do it with the greatest ease. But excitable temperaments, those who easily become aroused and who find it difficult or impossible to subjugate their emotions, are the persons who can do the least intellectual labor, and who suffer the most bodily harm from mental activity, when in excess. The fact is, what and how much we do is of much less concern than the way we do it. The calm and placid man can go on forever, like the smoothly-flowing river, with his intellectual labors, while the emotional person is exhausted by his emotions even before he begins to think. We see this difference well enough in men; we see the different amounts of mental as well as bodily labor which they can do, varying according to the nervous waste going on through their emotional activities, rather than measured by actual thinking. But the contrast becomes stronger when we observe the mental operations of women. Characterized as a sex with less manifestation of independent thinking, whether from a feebler endowment of reasoning powers, or whether because the intellect is so habitually subordinated to simple feeling, it is not necessary to discuss. But it is certain that the women of civilized communities are more emotional than are those of less favored regions, or else my observation has been at fault. While education in men makes them self-controlling, steady, deliberate, calculating, thinking out every problem, the intellectual being the preponderating force, the so-called "higher education" for women seems to produce the contrary effect on them. I am willing to admit and believe that it is not the fact of being educated which produces contrary effects in men and women, but the different ways in which men and women are educated. Still, it holds true that while men are calmed, women are excited by the education they receive. The emotions in savage men are the ruling forces, while they are subordinated to the intellect in the educated man. But the woman who has been put through the process deemed necessary to acquire the "higher education" is nervous, excitable, and in every way more dominated by her emotions than the savage woman is. Or, if the contrast is not so extreme as this, she certainly does lack that equipoise which is the characteristic of highly-educated men. In my capacity of surgeon I have frequent occasion to observe how different classes of women act under corresponding circumstances. My experience is such that I do not want a so-called highly-educated woman to take care of a case of hip-joint disease, for instance. For patience, for reliability, for real judgment in carrying out directions, for self-control, give me the little woman who has not been "educated" too much, and whose only ambition is to be a good wife and mother. She can be trusted to keep cool under trying circumstances; she does not have the backache; she does not tear herself to pieces with imaginary troubles nor insist on taking only emotional views of every incident of life. Her reason has not been put under the dominant influence of unmixed feeling, intensified by the process through which she obtained what is called her education. Hence her head is cool and her judgment clear. Such women are capable of being the mothers of men. But modern communities have too few of the even tempered, such as I have just described. Civilization is not an unmixed good, it carries penalties as well as compensations in its train.

It should not be lost sight of that women are emotional as a class of human beings, and there are many things incident to civilization which tend to increase to extraordinary proportions the emotional characteristics which pertain to them by virtue of their sex. The æsthetic form of emotion is so ready to be made prominent, and is so pleasing in its legitimate expressions, that some form of emotional exercise very easily becomes the principal feature of female education, so that the first we know, unless, happily, we are continually on the watch, the girl whom we send to school is increasing the intensity of her feelings much faster than she increases her stock of knowledge. I am not, at this time, discussing how this can be changed. I only desire to call attention to facts which must be familiar to every one. Thus tendencies endowed by nature, which would only harmonize her being to her position and destiny under favoring conditions, become exaggerated by inheritance and intensified by the education of the schools and the atmosphere of society, till the woman of our modern civilization becomes the bundle of nerves which she is, almost incapable of reasoning under the tyranny of paramount emotion, and some of them wholly incapable of becoming the mothers of rightly organized children. So the children are born many of them with big heads and little bodies and almost no digestion at all, but whether born feeble or vigorous they are ushered into an atmosphere of an intensely emotional character. Whatever may be the stimuli to intellectual activity, there are ten or a hundredfold more agencies which act on the emotions alone. It is to the fact that children are brought up in a hot-bed of emotional excitements to which I wish to call your attention. It is sufficiently deleterious to incite mental activity prematurely; but to prematurely and unduly excite emotional manifestations is tenfold more hurtful. It is just here that there seems to be the densest ignorance. Children are made to minister to adult morbid craving for emotional excitation by having their own emotions brought prematurely and excessively into action, just as if their powers of endurance were unlimited in this direction. People, and especially the female portion of society, do not stop to reflect that all the fondling which children (American children, I more especially mean) receive is not for the children's, but for their own sakes. Children are literally made to become little actors; but their fond relatives are not content with an hour or two a day, which is considered sufficient for adult actors, but they are kept going from morning until night. In my large practice among children I am certain that scores are literally killed by the excessive amount of emotional excitement which they are forced to endure. And much of it is, when we properly analyze it, from a purely selfish source. All this hugging and kissing and talking to them is to excite responses of the same emotional nature in the child for the pleasure and gratification of the parents and friends. There is really no thought that it is for the child's good. They are not content without securing some response, some prattle that shall be considered pretty, some embrace that betokens warmth of feeling, some witty saying that shall show smartness and sentiment, some act which shall thrill the family audience with delight. In fact, our children are made the means of filling us with thrill after thrill of delight through their responses to the emotional manifestations which we purposely and for our own selfish pleasure excite within them. But at how great a cost! It does not better the matter that people are not generally aware that it is their own and not always the child's pleasure which they seek in the excessive fondling which I am deprecating. Because they do not recognize the purely selfish character of the motive which makes children act day by day for the pleasure of the family is the reason that it is done; and it is the reason also, I may say, that I think it my duty to raise a warning voice against the pernicious practice, at some risk of denunciation, I am very certain. For it is a delicate thing to trench on the private ground of personal feeling and dispute with a mother how much and in what way she may love her child. But I hold that there is not a relation in life which may not be criticised in the right spirit, nor is there one which ought to be left to blind instinct or unreasoning impulse. Even maternal love may be a purely animal feeling, and when exercised without reason it may become an engine of cruelty and even death. Many such cases I have seen; one illustration will suffice for all. A mother brings her little child to me for a disease which is curable if immediately attended to, but fatal if appropriate treatment is delayed. I explain it all to her complete understanding. She sees that it may be cured, for she sees others like it which have been cured. She also understands that the chances are against its recovery, because she meets others in sorry straits who have neglected or delayed. But she will not leave it. There are those who can remain,—an aunt, an older sister, a faithful nurse. All to no purpose. The mother has, perhaps, a younger child at home, and cannot herself remain, and so the sick one must go home to die, or, what is far worse, to endure years of agonizing suffering, and then to live a short, decrepit life, with all bright hopes blotted out forever. This is what unreasoning animal affection may do, and what it is continually doing, to my certain knowledge. Another child, a beautiful girl, lives in its grandfather's family. Of parents and grandparents, of uncles, aunts, cousins and friends there are seventeen. It is the only grandchild, and the household draws a certain large portion of its daily emotional pleasures from this babe. It continually passes from lap to lap and from lip to lip, not allowed ever to go without returning some pretty prattle for the urging and caressing which she receives from morning until night. What wonder is it that evening finds her tired, peevish, excitable, and wholly exhausted? And when disease attacks her it finds weak resistance in a frame already enfeebled, at the tender age of four, by an overwrought brain. In this case I could manage the mother, with whom I came in personal contact. But she found it impossible to make the other members of the family let the child alone, and she was actually obliged, under my advice, to imprison herself in a room with locked doors to keep her sickly child from continuing to be the plaything of the family.

Now, what is the result of the system of child-management which keeps the young mind in continual excited tension?

There is a law of human force which proclaims that for every atom used in one direction there is an equivalent atom wanting in some other direction. How can there be a well-developed body in a child whose brain is kept excited and in whom a waste of force is going on far beyond the means of supply, except by drawing it from other directions? Thus the brain is supplied, in part, at the expense of the body; that is, the body is starved to support the brain, excited by the mind into unnatural and premature activity. And the worst of it is that there are no proper compensations. On the contrary, a condition of preternatural emotional preponderance is established as the inveterate habit of life. Hence the so-called "nervous" invalids, which exist in all civilized communities and are especially abundant in this country: persons who are frightened at any sudden noise, and whom the sight of a mouse throws into a cold perspiration. No matter how sensible they may be in calmer moments, their reason is dethroned and subordinated by the superior influence of easily excited emotions. Such are the persons whose flabby muscles and nerveless frames are only surpassed as a phenomenal fact by the amount of pain they can bear and still exist. Such persons are the products of civilization,—of that civilization which does not seek for and find the causes of its abortive products and endeavor to so arrange the checks and balances supplied by intelligence that the race shall not deteriorate through preventable causes. For the causes are largely preventable, and preventive means are daily used among those who are better informed on the subject. But there should be greater precautions used against the overaction of the brains of children, and it should be better comprehended that the overaction comes, for the most part, from the direction of the emotions. My professional life is spent, for the most part, in attending to children, and I have ample opportunities to see the evil effect on the bodily development of overwrought emotions. Feebleness, asymmetry, excitability, premature arrest of growth, are some of them. So that populations of cities, which come under the influence of more things which tend to excite emotion, become less and less in size until, it is said, that cities would cease to be if it were not for the constant influx of persons who were reared in the country, and so escape some of the body-dwarfing influences to which the children of large centers are so much subjected. The extent to which the influences under consideration go no one would imagine, perhaps, unless he were in actual contact with large numbers of children.

I may say that at least two-thirds of all lateral distortions of the spinal column are directly traceable to mental overaction, mainly, if not entirely, of an emotional origin. There can be no doubt that this is the fact, because not less than three-fifths of those of them who consult me in the earlier stages recover without any other treatment than a careful abstaining from whatever excites undue emotions in the subject of the distortion.

One little incident occurred a number of years ago, which may serve to fix the moral in your minds if I should relate it. Being in Wilmington, Delaware, at the time, I was consulted by a lady concerning her daughter, who had begun to give evidence of curvature of the spine. She was a good-sized child of about twelve, and I sought in vain, for some time, to find a cause for the weakness of the muscles which allowed the bending of her spinal column. Her lessons did not seem to be too much for her, her exercise was regular and sufficient, her food was proper, and, altogether, she seemed to be well managed. Still, there was an expression of fatigue in her face, and, though her rapid growth was exhausting her somewhat, as is always the case, that alone did not seem sufficient to cause the spinal muscles to give way and the spinal column to bend out of its proper direction. So I inquired particularly in regard to any outside influences which might tend to excite the child's emotions; but such inquiries were met by prompt denials. The mother was an unusually intelligent woman and seemed to comprehend the subject better than most. Two days afterwards, this mother returned to say that perhaps she had found the source of the child's loss of power,—for she was often nerveless and languid. She said that this girl was an especial favorite of her husband's mother, and that it was her custom to pay her grandmother a visit twice every week; she added that, now that her attention had been called to the subject by my inquiries, she remembered that her daughter invariably came home from those visits tired, nervous, easy to cry, and she was always glad to get her off to bed as soon as possible, and even the next morning there were often traces of the nervous excitement which she showed more especially the night before. Her grandmother, the lady said, was a very intellectual woman, and the child looked forward to her bi-weekly visits with great anticipations, but if I thought they had anything to do with the curvature she would stop them at once. I replied that I had no doubt but that they had, and they were accordingly put an end to. In other respects no change was made in her course of life. Three months later I was in the neighborhood, when the child was brought to me, this time perfectly straight. Ceasing to visit her grandmother had cured a curvature of the spine: cured it by preventing the bi-weekly exhaustion through excessive emotional excitation; thus muscular tone was restored. As before remarked, growth, especially rapid growth, is an exhausting process, and it is of the greatest moment that the process of natural growth should not be interfered with by unusual demands made on the nervous forces at the same time. Indeed, I think there is even more danger to the health in excessive mental strain during the period of rapid growth at the age of puberty than in childhood even. This is especially true in regard to girls. Their growth is generally more rapid than it is in the other sex. They pass through a stage of physical development in one or two years which boys require five or six to perfect. There is a correspondingly greater danger of overtaxing girls at this age. If we add to the natural bodily growth the development of the sexual functions, the important changes which take place in advancing from girlhood into womanhood, all accomplished within a short period of time, and each one a special tax on the vital powers, we can better comprehend how the human female is subjected to great and special causes of nervous exhaustion of a perfectly normal character at this period of her life. In fact, all human beings, at this time, pass through what may be called a vulnerable period,—pass through safely enough when the circumstances surrounding them are favorable, but not without damage when their vulnerability, at this time of life, is not comprehended and guarded against. So severe are the demands made upon us at this time, so completely absorbed are our nervous energies in the work of bodily growth and the development of special functions, that, under natural conditions, the action of the brain is somewhat retarded, and we find, between the ages of twelve and fourteen or fifteen, varying in different individuals, a well-defined period of mental sluggishness. Girls and boys at that age are said to be "green," which means that they are employed, absorbed, as they ought to be, in the more important acts of becoming men and women, and that, for the time, there is but little left for mental activities. This is nature's method. Let them alone and they will grow into full-sized men and women. Their frames will be strong and well-knit, their muscles firm, their organs of digestion and assimilation sound, and their functions vigorous and healthy. After the growth has been completed and the functions established, there is a rest and a respite. The mental faculties now wake up, there is more abundant material to feed the brain, now that there is less call in other directions, and we have the pleasant spectacle of a "sound mind in a sound body."

But what are the facts regarding modern and, especially, American civilized children? I speak still more especially of girls, because they are affected more by elements which disturb the natural order of things than boys are, though boys do not escape unharmed, by any means. Cunningly devised means for exciting feeling only, begun at the cradle, are continued through child-life up to the very verge of womanhood. The æsthetic alone, or almost alone, seems to be the sole idea of female mental existence. Thus they arrive at twelve or fourteen and on the threshold of the most important period of existence, utterly unfitted for passing through it. Excitable, with wide-open eyes and ears for every sight and sound which can excite feeling, rapid and intense in mental activity, with thin limbs, narrow chest, and ungainly back, we meet these twelve-year-old products of civilization going to school with an average of thirteen books under their feeble arms, for I have found by actual count that thirteen is the average number of studies which they "take" nowadays. Do they study them? Undoubtedly, for the sake of being at the head of the class, or of not being at the foot, or to recite them or to *say* they study them, etc. But you will find almost invariably some emotional motive connected with the education of girls, as now conducted, in the majority of instances. Now, what is the girl's chance for perfect development under such adverse conditions as those which I have briefly pointed out? The chance is poor indeed, and the result is deplorable. With the mind thus forced to an unnatural activity, the emotions strained up to the highest tension, at such an important period, what chance has the body to attain a perfect growth or the various functions to be properly developed? Hence we see that generation after generation becomes smaller and smaller, until nature ceases to reproduce its own, and new blood has to be brought in to keep the race from dying out. Take a walk on the avenue of a Sunday afternoon and witness the large proportion of diminutive men and women which we shall meet. Then tell me if I have overdrawn the picture.

Now, whatever premature and excessive mental activity does in dwarfing the bodily growth and in enfeebling the functions in general, it effects, perhaps, even more the impairment of different organs and the curtailing of their special functions. There are very few well-formed bodies among our young women. The impression which an examination of the person gives is that they have been starved. And starved they literally are. The major part of the nourishment, which they could digest and assimilate, has gone to keep up the constant, excessive expenditure through the brain and nervous system, leaving an inadequate supply for the bodily growth and development. There is always a limit to human endurance at every period of life. Even with adults, the man who thinks much must be content to work less. He cannot do both in equal measure at the same time. Or if he works severely with his muscles he must be satisfied with less rapidity in his mental operations. The body is equally starved, whether, like the Australian bushman, from insufficiency of food, or like the Laplander, whose food is converted into fuel to keep up the animal heat; or like overworked children in some factory centers, whose bodies are dwarfed because all the food they eat is used to support their labor, and they have no vital remainder whereby growth may be effected; or as in the case of the overwrought brains of our "civilized" children, which absorb an undue share of the vital forces, and thus the body is left to starve. Hence ill shapes and distortions. Hence want of symmetry as to the trunk, and disproportion in the extremities. Hence weak muscles and indigestion. Hence teeth imperfect in development, dentine soft, enamel defective and easily penetrated. Hence decay.

One who is not accustomed to examine the persons of large numbers of people can have no idea of the varying characters of bodily deficiencies and imperfections which he will meet without attracting the notice of the ordinary observer. I have a patient now with one leg two inches longer than the other; and a difference of one inch in the lengths of the lower extremities is a relatively common occurrence. So of every portion of the body. It is seldom even tolerably perfect among the higher classes. And I have no doubt that the cause of these imperfections lies more in the diversion of the nutrition which should feed the bodily growth, from its proper direction, in consequence of emotional excitation, than any other cause which acts on the members of civilized communities. But, of course, there are exceptions to this rule as there are to every other; that is, there seem to be exceptions, but they are of such a character as to prove the rule. We see persons with poor apologies for bodies, but with excellent teeth; while we also see persons with sound, strong bodies with defective teeth. When the nutritive supply is inadequate, accident determines which particular organ shall suffer most and which shall be comparatively well nourished. When any organ *may* suffer it is pretty certain that some one eventually *will* suffer. I repeat that those who seldom or never have occasion to examine the whole person can scarcely appreciate in what varied forms the results of the bodily starvation which I have pointed out in this paper may assume. I continually see persons with one-half of the trunk, perhaps, tolerably well formed, while the other half is defective in various particulars; not as the result of regular and recognized causes tending to produce a distortion of the spinal column, for instance, but as the result of imperfect growth and development alone. When an acorn is dropped on the steep, rugged hill-side, with scanty soil, the washing rains, the winds, the frosts, and the droughts, the tree it produces is blighted and dwarfed compared with its brother oak grown in the fertile valley. But no one can tell which particular branch of the scrubby oak will first decay. So with the starved and shrunken bodies; one cannot tell which organ will weaken and fail before the others. And it does not militate against the indictment which I bring against overworking the young brain by exciting intense emotions, to freely admit that multitudes escape in part or wholly many or all of the evils which others, with feebler powers of resistance, suffer from. For, after all, human nature is hard to kill, else the race would have been extinct long ages ago. The surgeon's skill, the physician's art, the dentist's wonderful dexterity, may often largely compensate for defective organs and curtailed powers. Sanitary science, also, ventilates our dwellings, gives us baths and household comforts, and inventive genius largely abridges the drain on human muscular strength; so that we find two opposing sets of forces acting in opposite directions on the individuals composing society. One set of forces tends to weaken and abridge human life, while another set tends to strengthen and to lengthen it. My object in this paper has been to call attention to some of the most important and, as I believe, less frequently appreciated of the influences which strongly tend to weaken and destroy life.

I am aware that it has been proposed to correct imperfect bodily development by various expedients, all more or less directly concerning the nutrition, either as medicaments, containing, in larger proportion or in more easily assimilable form than is to be found in ordinary food, some of the elements supposed to be in diminished amounts in the systems of delicate persons; or by a diet of substances containing the desired elements in greater abundance than exists in the ordinary food of the people. And there can be no doubt that something can be done in either direction which will have a good tendency and be calculated to ameliorate some of the worst results of the deteriorating effects of mental exhaustion. But, after all, such proposals must be considered as proceeding from very superficial examination into the causes of bodily imperfection in civilized communities. The Chinese attain a good stature and have perfectly formed teeth on a diet of rice, and the Esquimaux have sound teeth on a diet of blubber. I do not pretend to say that either rice, blubber, or any other diet so imperfect as either must be will produce as good specimens of man, under the same or corresponding circumstances, as a food which contains the assimilable substances in better proportions. But my object is to show that there is something back of the food in the condition of the system which makes it possible for perfect men to be developed under such unfavorable conditions, or for so poor specimens to be so common in civilized communities, with all the advantages which the latter have over the barbarous in selecting food. These indisputable facts cannot be reconciled except by supposing that the greatest factor of all in modifying bodily development lies in that which most distinguishes the civilized from the savage,—the mind. It is here that we must look for most of the modifying influences on the bodily powers, and it is here where our remedies must be applied if we would see an average of bodily perfection in civilized society.

If I have succeeded, in any measure at all commensurate with the magnitude of the subject, in impressing your minds with its importance, I shall be well paid for the trouble.

PROTRUSION OF THE LOWER JAW.—A CASE IN PRACTICE.

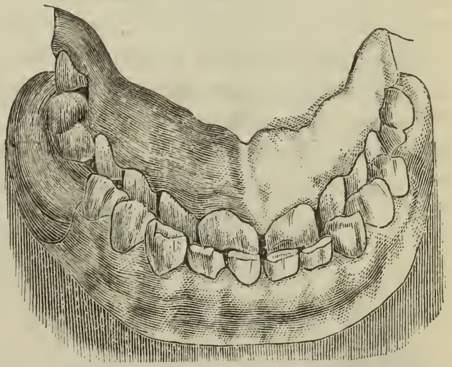
BY THOMAS WARDLE, M.D., D.D S., PHILADELPHIA.

A case of this character, presented before the New York Odontological Society by Dr. George S. Allan, was reported in the February number of the Dental Cosmos. In the discussion which followed Dr. Francis asked, " Would you treat a case like that in a child fourteen or fifteen years of age?" To which Dr. Allan responded, " I would not advise the process in any case over twelve years of age, but up to that age I would advise it."

To throw some light upon the question thus started the following case is reported, as having special value from the fact that it has stood the test of time.

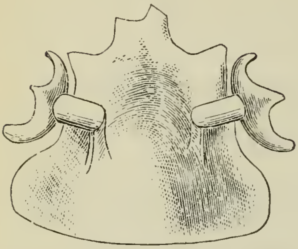
In 1864, Miss J. R., aged nineteen, presented the deformity illustrated in Fig. 1. At the urgent solicitation of the parents of the young lady I consented, though with some doubts as to my success, to attempt its correction. The central incisors had been filled from their cutting edges with gold, but they were unfit to be retained in the mouth longer than during the correction. As the arch of the upper teeth was much less than that of the lower, the outer cusps of all the latter were outside of the former, necessitating an expansion of the arch of the upper jaw as well as a reduction of the protrusion. To accomplish the first object a self-acting plate was designed, illustrated in Fig. 2. The plate, which was of gold, was made to fit the arch of the mouth as for an upper denture. To this were soldered two posts of platinized gold, set opposite the palatal faces of the bicuspid teeth and about three-eighths of an inch distant from them, their lower ends being on a line with the cusps of the teeth to be acted upon. At right angles with these were soldered oval tubes, closed at their palatal

Fig. 1.



ends by the posts to which they were soldered. To these oval tubes were fitted sliding bars having semicircular clasp-shaped cross-pieces neatly fitted to the bicuspid teeth. In the application of this plate to the mouth, small pieces of soft rubber were inserted into the tubes, and increased from time to time as required, which maintained a gentle constant pressure, resulting in a short time in the desired expansion of the jaw and a lowering or flattening of the palatal arch about three-eighths of an inch. This little appliance was worn with entire comfort, and the patient soon learned to adjust it herself.

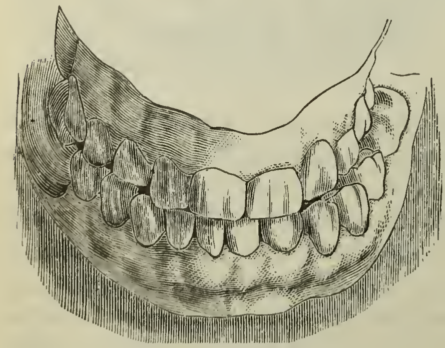
Fig. 2.



Previous to any attempt to overcome the protrusion of the lower jaw it was necessary to extract the last tooth on one side of the upper jaw, because of its antagonistic relation to the lower teeth. A cap was made of strong twilled silk, lined with unbleached muslin, covering the head completely, the sides coming a little below the upper part of the ears, and was cut out to fit around them. A chin-piece was made of morocco leather, which was lined and fitted to the chin, covering the space between the bicuspid teeth. To the ends of this chin-piece were attached straps for attachment to the cap behind the ears. Two other straps were attached to the upper edge of the chin-piece, arranged to join the head-cap about the center of the attachment of the temporal muscles. The four straps were thus attached to the head-cap, divided in their centers, and provided with buckles so arranged as to prevent their coming in contact with the patient's face. The whole apparatus was so simple in its construction that the patient could remove or adjust it at pleasure.

The correction progressed slowly but without interruption, and was accomplished in about one year, presenting the appearance illustrated in Fig. 3. The patient, however, had become so accustomed to her head-dress that she continued to wear it at night for a year longer. It was not possible to bring the lower teeth within the arch of the upper jaw,—only to make the teeth close edge to edge; but the improvement was very marked, and the operation was entirely satisfactory to the patient and her

Fig. 3.



friends. Fourteen years have passed, and the condition remains the same as it was in 1865, and as shown in Fig. 3.

This case proves the possibility of correcting such deformities at a later period than such operations are usually attempted.

THE "TRUE INWARDNESS" OF THE "NEW DEPARTURE."

BY J. FOSTER FLAGG, D.D.S.

(Read before the California State Dental Association, May 15, 1879.)

Mr. President and Members of the California State Dental Association:

GENTLEMEN,—It is with feelings of peculiar pleasure that I address to you this paper. As an old Californian,—one whose earliest years of practice were passed in your State,—I desire to write to *you especially* of the true inwardness of the "New Departure."

You know full well that this is dear to me,—you know that nearly all my best years have been devoted to its preparation.

You know that I have thought long and earnestly over this movement before embarking in it.

You *must* know that nothing of self-interest could have actuated either my friends Drs. Palmer and Chase or me in the work of promulgating views so at variance with the ideas of the vast majority of our fellows.

You *must* know that nothing but a clear and strong sense of *duty* could have forced us into this struggle,—a consciousness of duty to our profession, to those who seek its services as patients, and to ourselves.

We knew full well the misconstructions which would be put upon our utterances.

We knew full well the denunciations which would be heaped upon us.

We knew all this from past experience, for we were no novices in dental warfare.

But we also knew that we had each striven to make a "record,"—one that should help to sustain us in this our time of need, one to which we could point as voucher for our earnest, long-tried love for *dentistry.*

We had looked upon the *results* of *our* years of conscientious toil and *we* were *not satisfied.*

We had looked upon the *results* of *others,*—those who stood high in rank and who rejoiced in the appellation of "able" men, who professed to have *few, if any, failures,*—and we could not see that they had any *just cause* for all this self-congratulation!

Their patients' mouths—like ours—were semi-edentulous; their patients' lips—like ours—parted over *artificial dentures.*

And so we worked,—long, patient *years* of work,—and made our preparations for the onslaught.

It is a long story—that of the resistance offered,—and yet it may some time be told; how Palmer's papers fell still-born in his State society, teeming, as they did, with principles full of the strongest life for *tooth-salvation*, and "passed" without one word of comment; how sections of the utmost import were closed in that fountain-head,—the American Dental Association; that Chase's mouth should also close as well; how the executive committee of '78 *returned to me* my paper as of "no interest or value to the profession" (these were the chairman's words), and were only *made* to "reconsider" (!) by the most strenuous and determined efforts of personal friends; how, even after being read, the Publishing Committee *unanimously* thought it "*their duty*" to *deny it publication in the "Transactions";* how misrepresentation, even to falsification, was deemed needful to stem, if possible, the current which was *sweeping to destruction*—WHAT?

Now, gentlemen, I ask you to stop and carefully consider—*what?*

The beliefs of that practice which has eventuated in placing the *artificial teeth of American manufacturers* first on the list.

The beliefs of that practice which has resulted in the gradual decay and loss of the *vast majority* of soft, frail teeth, which have been *constantly under its charge.*

The beliefs of that practice which has led to an amount of expenditure of time and money, for which the return of tooth salvation is utterly inadequate.

The beliefs of that practice which has *taken from dentists* an amount of *life-force* fearful to think of, and returned to them an aggregate of *failure in operations* dreadful to contemplate.

The beliefs of that practice which has inflicted such suffering, nay, *torture*, upon its victims, as to have rendered the *thoughts of dentistry* provocative of *shudder*, and the *name of dentist* almost universally coupled with feelings of *detestation.*

All this has been brought about directly from the teaching that "gold is the *best* material for filling teeth;" that, "if within the bounds of possibility, gold *should* be employed if the *best* is desired;" that "time, patience, skill, money, suffering, all should be laid upon the altar, that the *grand result* may be an elegantly-introduced, thoroughly-impacted, highly-finished, artistic—gold filling!"

This is so, gentlemen, and all the heavy thinking of the "best men" of our profession has been directed to the attainment of *this end.*

It mattered not that gutta-percha had been *proven* capable of saving soft teeth almost indefinitely, it was again and again *removed* from teeth in which it was *doing full duty*, and replaced by gold, which in a year or two, or three, *failed miserably!* and this, too, *because* gutta-percha was only a *temporary* filling, while gold was a *permanent stopping!*

It mattered not that amalgam "stood," *saving* its "worthless shells," while the "good teeth" slowly but surely crumbled away from the over and over again introduced "jewels of gold,"—*gold was the* "BEST," *though the teeth were* LOST!—and amalgam was "*vile*," though the teeth were *saved*, because—because, forsooth!—*they were discolored by it!*

And men who saw this thing, and used these "temporary" and "vile" materials, to the *comfort* of their patients and the *saving of their teeth*, were ranked as "Second Class."

And men who filled with gold *exclusively*, and whose operations failed from "defective manipulation!" and who finally extracted (or had extracted by the gas-men!) hundreds of thousands of their patients' teeth, replacing them with "artificial *substitutes*," were ranked as "First Class!"

Do you suppose that "New Departure" could long stand this? Do you suppose that "New Departure" *will* long stand this?

Indeed it will not! It has thrown down the gauntlet, and challenged to a combat for which it feels well prepared; it believes that its "Basal Principles" are founded in *Truth*, and that they will bear the most rigid scrutiny of modern science.

It courts examination; it asks for trial; it throws to the winds the foolish belief that the finest works of our most skillful operators fail because of "defective manipulation," and enunciates that "compatibility of filling material with tooth-bone is the grand foundation-stone for *tooth-salvation;*" it throws to the winds the foolish teaching of our "accepted" text-book, that "a tooth that is worth filling at all is worth filling with gold;" and in its stead enunciates that "a tooth that can be so treated as to be *satisfactorily* filled with *anything* is worth filling."

It is strong in its convictions; sure of its facts; certain as to what *it has accomplished;* and has for its aim the accomplishment of *almost universal tooth-salvation.*

And this effort, you are told by more than one president of State societies, and others of equally high authority, is made with the view to prove that "caries of the teeth is due to electricity!"

This seems to be their highest conception of the upheaval which is going on around them, and their idea of what the "New Departure" expects to accomplish!

What can be said to such exponing opponents? or perhaps I might better ask, What *need* be said to them?

If that is *all* they can glean of the "*True Inwardness*" of the "New Departure," they can scarcely claim the attention of its advocates.

If that is what they dissent from,—and they do not know that in dissenting from it they are not in the least antagonizing "New Departure" principles,—it can hardly be worth while for its advocates to enlighten them.

And if they *willfully* pervert and misrepresent our views, for the purpose of misleading others of our profession, what good would it do them that we should correct them?

But for you, gentlemen, we desire that *you should know* of the fullness of the "*True Inwardness*" of our movement.

We desire that you should observe *how little—how very little* we have asked that you should deviate—*at first*—in practice from that which is usual practice.

We *say, fill all you can and do*, SATISFACTORILY, with gold—WITH GOLD! *It is so stated in the bond!* Can you, in turn, require anything more? Why do you desire to fill such teeth as you cannot fill "*satisfactorily*" with gold with that material? And then, because it is replied that dentists have "long done this;" that they "*have* used plastics when they could not use gold;" that they have for a long time "used their *judgment* in this matter;" it is argued that after all the "New Departure" is *no* "New Departure!"

They don't believe in it; they are opposed to its teachings; they think it tends to *degrade dentistry;* their contempt for it is inexpressible; and they have *all been practicing it from time immemorial!*

Curious, isn't it?

But the truth is, that the "*True* Inwardness" of the "New Departure" is a very different thing from this. Its design is to teach a principle which shall indicate *lack of knowledge* as the cause of "failure in operations," instead of attributing it to "defective manipulation."

Its design is to teach dentists that, in the abandonment of gold for filling soft, frail teeth, they do *not* abandon the "best" material for filling frail teeth, but that they *do* abandon the *worst* material *for that purpose* in the whole list of filling materials; and that when an *educated* man—a man educated in the "Science of Filling Teeth," not from the "finger-skill" stand-point, but from the "compatible" and "physical characteristics of filling material" stand-point—selects gutta-percha to subserve a definite purpose toward the *salvation of a tooth*, then *knowledge, not "judgment,"* is at the helm, and gutta-percha is the "*best!*"

And when the same style of man selects amalgam to do his bidding, not selecting it because its advertisement says that it "neither shrinks nor corrodes"—when it does both!—but because he has been informed of its composition from the lecture-stand, and taught of its value and properties from the same reputable source, then amalgam becomes the "*best*," *because it is the* "*best*" that is known for the purpose for which his *knowledge*, *not his* "*judgment*," had chosen it.

Its design is to effect that "revolution" in dental ideas which shall eventuate in its "coming to pass" that those who try to *save teeth*, and who are *successful in saving teeth comfortably*, *gently*, *beautifully*, and *satisfactorily*, shall be ranked as "FIRST *Class*," just "in proportion" as they do this, and *not* "in proportion" as they are able to *pack gold;* and, inversely, that those who inflict suffering, consume time, entail expense, fail from "defective manipulation," and employ artificial substitutes, shall be ranked as "SECOND *Class*," even though their skill in working gold shall rival that of all their brethren, and the "artistic beauty" of their results shall be "worthy the genius of a Michael Angelo!"

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

CLINICAL SERVICE OF PROF. J. E. GARRETSON, M.D.

Caries of inferior maxilla.—The child standing before you, gentlemen, is our first patient this morning. For the opportunity to study the case we are indebted to Dr. George W. Ellis, late a teacher in this institution, who kindly sends it to us for treatment.

When I turn towards you the neck of this little girl you observe a discharging fistula, situate midway between the symphysis and ramus of the jaw. This fistula, as the mother tells me, has existed for twenty-four months, and discharges daily as much as a teaspoonful of pus.

From the situation of the fistula, I infer it to be associated with the teeth. Let us look. I think, gentlemen, that, with me, you are surprised to see organs so healthy looking; here is no appearance of decay, no sign of periodonteal trouble, no phenomenon of gum-congestion. I deemed the case one of ordinary alveolo-dental abscess. It certainly is not that,—at least it is not that as the condition is ordinarily understood by us.

What is the disease? This we are to find out. First, I pass this silver probe into the fistula; it passes, as you see, quite half an inch, and, as I infer from the feel, into bone. I now withdraw the probe, and follow it in the exploration with a sharp wedge-bladed excavator. Again the touch recognizes the instrument as being in contact with bone; more than this, it recognizes that the bone breaks readily before the steel; the bone is in the so-called honey-comb condition; the bone is carious. Caries is our diagnosis.

The case, gentlemen, is somewhat rare,—it is a case of caries of the body of the inferior maxilla. You will not meet with, in your experience, many cases of caries of the body portion of the inferior jaw. Of necrosis you will see many cases; of caries, very few.

A diagnosis secured, questions of cause and condition arise. What has caused caries in the jaw of this child? How extensively are we to find the bone involved?

The age of the patient is six years. These very good teeth that we see are milk teeth. Within the jaw are the rudimentary permanent teeth.

I proceed now to make a longitudinal incision of an inch in length below the roots of these milk teeth. I make the cut with the object of seeing where it leads. I put pressure upon the blade. I find what I expected to find: the blade has passed through a crust of outer plate into an osseous spongy mass.

I now again introduce the silver probe into the sinus. As you see, it passes from without into the mouth.

We turn now again to the inside. With this excavator I feel the enamel surface of three or four teeth. This, of course, we would expect,—the teeth felt are the new teeth.

The condition we now comprehend. It is that of a carious mass of bone, among which lie several partially developed dead teeth.

The cause of the condition is another matter. I direct particular attention to absence of sensibility as manifested by this little girl. Of all the dead and alive people, big or little, I have ever seen, this is the most dead and alive one. You have not as yet seen her wince. I doubt if she ever winced in her life. I gave her a good trial at my office before bringing her here. I utterly failed to make her cry. Indeed, I utterly failed to compel the twitch of a muscle.

In the same direction I call attention to the molar teeth on the opposite side of the jaw. The process, as you see, seems to have disappeared from about the roots of these teeth. "Absorbed," as you would say, and that is the right word; the jaw itself looks to me as if it would absorb in bulk or break down, or disappear somehow. The child is odd; the case is odd; both are odd together.

Offering my own conclusions, I would suggest that the cause of the caries lies in conditions constitutional and local. On the part of the system there is want of vital activity to correspond with the requirements of waste and repair; on the part of the jaw, there is lack of organizing force to accord with the work of dental development demanded to be done; the jaw has simply given out and died. The case is one of a clear break down.

Now as to treatment. The caries in the case is a kind of old man of the sea on the shoulders of a child Sindbad. The incubus must be gotten rid of. If the caries is not removed by means of external assistances, the whole jaw will be sure to die; indeed, I would not like to say that it will not die, do what we will to help it. To assist the jaw I proceed to operate upon its incubus. . . . (Child here etherized.) . . . I do not etherize the child out of any idea that it would suffer from an operation, but really more from habit of the thing.

Here I show you rose-drills, delicate gouges, and root-forceps. First I use a gouge. Remark with what freedom it cuts away the bone. The partially developed teeth we lift out with the forceps. You notice that these teeth are without attachment. Now the rose-drill applies. Wherever the bone is soft I follow it in the operation. Little by little I am getting away the honey-combed mass. . . . I think that now we have all dead and dying bone away. Next we thoroughly syringe the parts, which, having cleaned, we will now pack with lint saturated with carbolic acid water.

Now as to systemic treatment. I will order, as the medicine indicated in the case, the tinctura ferri chloridi combined with quiniæ sulphas; the prescription shall be as follows:

℞ Tincturæ ferri chloridi, ℥ss;
Quiniæ sulphatis, gr. xx.
S.—Ten drops to be taken in a wine-glass of water four times a day.

As to after-treatment: the wound is to be dressed daily with an antiseptic and stimulating lotion. Carbolic acid water answers the indications, and this will be what we shall use.

A danger to be apprehended is necrosis. To avoid it, however, we can do nothing more than is suggested. If necrosis ensues, we shall have necrosis to treat. I expect this complication in the case.

Our next case, gentlemen, is a private patient, kindly sent to me by Dr. Hertig, of Waynesburg. As no objection is interposed, I give you the advantage arising out of a study of it with me.

I lift up the lip of the patient and call your attention to the appearance of the mouth. You have never, I am sure, seen healthier-looking gums. The gentleman has lost two of his front teeth,—that seems to be all his trouble.

The history of this case, as I understand it from Dr. Hertig, is as follows: Three years ago the patient had pulpitis in the teeth now wanting; this pulpitis, in defiance of treatment, progressed into periodontitis; the periodontitis passed into abscess. The discharge refusing to succumb to remedies and the teeth showing every evidence of necrosis, the central and lateral were extracted. Still discharge continues.

I call attention to the existence of a very little opening on the face of this remarkably healthy-looking gum, into which opening I pass the probe held in my hand. What I feel as I thrust the instrument forward is an apparent *cul de sac.* I want some of the members of the class to take hold of the probe. Let the touch which guides the instrument see if it distinguishes aught else than that which feels like gristle. . . . All get the same sensation.

Now, gentlemen, we all know that what we touch is not healthy gristle, and we as well know that the apparent *cul de sac* is a bottomless bag, only because the instrument used is too large to go through it. I verify this by using a sharp-pointed excavator. . . . I find the instrument now passed through the *cul de sac*, and that it is among honey-combed bone. In this instance the honey-comb is remarkably crisp,—the instrument breaks it down in every direction. The cause of the continuous discharge is now apparent: our patient has caries of the maxilla.

The diagnosis, however, just given is but a verification of that previously made by Dr. Hertig. The patient has not only had his case diagnosed, but has been treated by the ordinary acid injection, *secundum artem.* Acids having been fairly and fully tried by Dr. Hertig, it is certainly no indication of the case to repeat the trial. What I propose to do for the patient's relief is to operate; that is, to remove all dead and dying bone met with in the jaw. . . .

The instrument held between my fingers is a finely-cut and stoned bur. To use it I, of course, employ the engine. I commence the operation by an incision made across the face of the gum, pushing the blade of the knife down into the carious bone. . . . The blood being mopped away, we are now ready for the bur. Dr. Kelleck shall manage the treadle of the engine, while I manipulate the bur. This means of operation by the engine is wonderful. By the rapidly-increasing freedom permitted in the movement of the bur you will measure the progress that is being made. . . . We will now stop for a moment and examine the state of the parts. . . . As yet we are not at the end of the caries. Again we introduce the bur, and again advance with our cutting. . . . I think if the gentleman who sends me the case were present he would be as astonished as I am at the extent of the disease. . . . Still yet the probe shows no bottom. As yet we must resume the cutting. . . . The bur, gentlemen, is at this moment passing through the palatal process, and, even as I speak, it has passed and is now separated from the nasal passage by mucous membrane alone.

Again I stop, and with the probe find out where I am. I feel an apparent pocket running in the direction of the antrum. This pocket we must follow. . . . Listen now to the cutting of the bur,—a difference in sound to that given out a moment back is markedly perceptible. The bur has reached healthy bone. Now I will withdraw the instrument and feel again with the steel probe. Already it is in another pocket. The operation of burring is to be renewed. Again I feel; again more soft bone; again I re-employ the bur.

. . . I am sure, gentlemen, that now all carious bone is removed. This I want you to be sure of yourselves. Two or three of you may take turns at the probe. Touch gently, but not so gently as to overlook soft bone. Healthy bone is hard; if you feel aught else than hard bone, being careful of the entrance we have made into the nose, you feel disease, and I shall be proved wrong in the conclusion that the irritant is all away.

The free bleeding accompanying the operation arises from the cutting of the anterior palatine artery. This bleeding need give no concern,—a bony cavity offers every advantage for packing; hemorrhage in such cavities is entirely under control.

I shall now have this cavity syringed daily with a weak solution of carbolic acid water. I shall also order free doses of muriated tincture of iron to be taken four times a day. Iron, by the way, in this particular form is never out of place in osseous caries; no medicine more than this is provocative of granulative effort. I lean strongly on it, and seldom feel myself disappointed in the strength of the staff.

Saturday, March 22, the above two patients were again brought before the class. The wounds in both cases were filling up most satisfactorily. Concerning the last case, Dr. Garretson remarked that four hours after the operation performed on the previous clinic day profuse hemorrhage came on, compelling the introduction of a very solid packing, which hemorrhage repeated itself, when, on the succeeding day, attempt was made to remove the plug. To obviate this trouble the packing was renewed and allowed to remain until Friday, when it came away covered with pus, this expressing, of course, that hemorrhage risk was about over.

Dr. Garretson remarked that the success was so unexpectedly satisfactory in the case of the little girl that he felt quite certain of getting a speedy cure. The second case yet discharges considerable pus, but the wound made is gradually filling up.

PROCEEDINGS OF DENTAL SOCIETIES.

ALUMNI ASSOCIATION OF THE PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

REPORTED BY JOHN W. ADAMS.

A MEETING of the Alumni Association of the Pennsylvania College of Dental Surgery was held February 27 and 28, 1879.

An article entitled "Is Dental Caries accompanied by Inflammatory Action?" was read by Dr. C. S. Beck, of Wilkesbarre, Pa., as follows:

"The idea of life, in its simplest acceptation, is that of vital activity, and obviously, therefore, involves that of change.

"We do not consider anything as alive which is not undergoing some continual alteration, however slow and obscure, that may be rendered perceptible to the senses.

"This alteration may be evidenced by the growth and extension of the organic structure, or by molecular changes in its substance which do not produce any apparent increase; or, it may be most obviously manifested in movement such as cannot be attributed to any physical cause.

"The life of any complex organism such as that of man, is, in fact, the aggregate of the vital activity of all its component parts; and nothing has been more clearly ascertained by modern physiological research than this.

"In every living structure of a complex nature, while we witness a great variety of action resulting from the exercise of the different powers of its several component parts, we at the same time perceive that there is a certain harmony or co-ordination between them, whereby they are all made to concur in the maintenance of the life of the organism as a whole; and if we take a general survey of them with reference to their mutual relations, we shall perceive that they may be associated into groups, each consisting of a set of actions which, though differing among themselves, concur in affecting some positive and determinate purpose. These groups of actions are termed functions."

In the present advanced state of anatomy, physiology, and histology, every doubt as to the human teeth being living organs has passed away. We see nature very early in uterine life making provision for the development and growth of the teeth. We see, too, that they are connected with the general system, and derive their nutritive supplies, like all other organs of the body, from the blood.

If these physiological facts be true, may not the teeth be subjected alike to some of the diseases which other organs are heir to? From the material supplied in the food there is prepared, by the digestive and assimilative processes, the blood. Upon the circulation of the blood through all parts of the fabric depends the nutrition of the tissue. "Disease is a state opposite to that of health, consisting in a change either in the position and structure of parts, or in the exercise of one or more of their functions, or in both."

If any one of the organs or tissues of the human body be irritated, it is occasioned by some stimulus, which stimulus causes an increased flow of blood into the capillary vessels; these vessels become over dilated and enfeebled, the result of which is pain, redness, heat, tenderness, and swelling. These symptoms will appear in greater or less severity according to the structure, vital properties, and function of the parts affected, and in connection with other parts as well as according to the constitution of the individual. This we call inflammation. The predisposing causes of inflammation are the same as arranged under the head of predisposing causes of disease, viz., debilitating influences, excitement, previous disease, present disease, hereditary constitution, temperament, age, sex, and occupation. Local causes of inflammation comprehend irritants, whether mechanical, chemical, or vital. A grain of sand in the eye, a thorn in the true skin, a wound in the flesh are some of the mechanical irritants. Chemical irritants are such agents as operate on living matter by strong chemical affinity, and tend to alter or decompose it, —heat, strong acids, and alkalies, various salts, etc. Such act in like manner on dead tissue.

"Vital irritants are various agents which produce no effect on dead animal tissue, and whose irritating operation is not referable to any known chemical property of this kind, as cantharides, mustard, capsicum, and the essential oils."

If the web of a frog's foot be placed in the field of the microscope so as to bring to view the circulation, and one of the essential oils be applied, the following phenomena present themselves. The red corpuscles of the blood lose their circular form, and adhere together. The white corpuscles remain opaque, and are often more abundant than usual. This is inflammatory action.

If the cellular or serous membrane be affected, the inflammation is more active than when the mucous membrane or skin is affected.

Inflammation may end by resolution, suppuration, gangrene, adhesion, effusion, or induration. For instance, when the effusion takes place between the bone and periosteum, it may terminate by absorption or be converted into pus or become organized into fibrin, and the fibrin into true bone.

Caries of the bone is an inflammatory process called osteitis, and has its origin in the soft parts of the bone, and erodes its hard tissue;

but in the tooth the carious process has its beginning in the hard tissue, and spreads to the more vascular, the dental pulp.

"The human tooth has entering into its formation the following tissues: the pulp, dentine, enamel, and cementum. The pulp occupies the center of the tooth, and consists of a rich plexus of blood-vessels and nerves, held together by connective tissue. Covering the periphery of the pulp is a layer of cells called odontoblasts; passing from these are processes; some enter the canaliculi of the dentine, and some pass laterally to connect with other odontoblasts, while others connect with cells which lie more deeply, and are called pulp processes."

"The dentine is an organized matrix highly impregnated with lime-salts; traversing it are innumerable canaliculi which have their origin in the pulp-chamber, and ramify in every direction towards the enamel and cementum. Each of these tubes is occupied by living fibers. These ramify and pass through the walls of the canaliculus into the basis substance, forming a network of living matter, and anastomosing freely through the dentinal tissue."

"The cementum is traversed by cavities which contain nucleated bodies similar to the Haversian canals found in bone. From these nutritive cells are sent off delicate branches which anastomose freely in the basis substance with those sent off by the dentinal canaliculus. In the enamel we also find living matter in the form of very delicate fibers. These send off shoots into the dentine, and at the neck of the tooth into the cementum. We have then a complete plexus of living fibers in all the tissues of the teeth, and they ramify freely one with the other. Then the tooth as a whole is connected with the jaw by the periosteum, which invests its roots."

"We must then admit the tooth to be a living body, and that it is subjected to any morbid process which will react upon the living matter of the tooth just as any other tissue of the body."

Dental caries has been the subject of much thought and study among some of the talented and ablest physiologists and pathologists both of this country and Europe. From the days of Hippocrates down to the present time, several theories have been advanced as to the cause of dental caries. Hippocrates and his pupils were humoral pathologists, and hence they referred caries to a bad condition of the humors; these views were held for over a thousand years. Fauchard took a great deal of pains to discover the worms supposed to be in most cases of decay, but never succeeded. Hunter, with his false physiological views, regarded the teeth as foreign bodies in a certain degree, and they only received nourishment when sound, and fit for use. Fox considered "the proximate causes of dental caries to be an inflammation in the bone of the crown of the teeth, which, on account of its peculiar structure, terminated in mortification."

The present theories are the vital, the chemical, the electro-chemical, and the parasitic. To enter into a discussion of these several theories would be foreign to this paper. Suffice it to say, still to-day, in spite of all the researches which have been made, we are not clear upon this subject. One thing we do know, viz., that decomposition of the dental tissues must be preceded by their death; but usually we can only know that the latter condition exists by the presence of the former. We know that one condition has occurred by the presence of the other. We also know that the human tooth is a living organism, that its connection with the general economy is similar to that of other organs. It is supplied from the circulation with blood. Its pulp-tissue is a rich mass of blood-vessels and nerves. From its protoplasmic bodies pass fibers which traverse its entire structure. That these are facts favorable to inflammation when subject to irritating causes, I think cannot be denied.

We have seen that the degree of inflammatory action depends on the condition of the tissue affected. Now do these living fibers which pass into tooth-tissue induce the flow of blood or some other fluid which carries the calcifying material and deposits it at the line of demarkation which is to be found in all teeth affected by dental caries?

This barrier is situated between the pulp and the devitalized dentine. We are told it is produced by the consolidation of the canaliculi, and if the first line be destroyed by the advancing disease, a second is thrown up, and one after the other until the pulp-tissue is reached, and it in turn becomes subject to inflammation and irritation, which induces it to renew its formative function. This is what we hope to bring about when we cap an exposed pulp. This vital act,—this self-protective principle, does seem to be accompanied by more or less inflammatory action. May it not be possible that this line of separation between the dead and the living is a fact similar to that which takes place in other tissues of the body, and which the surgeon sometimes waits for before operating? May it not be analogous also to that which occurs in the soft tissue, when inflammation advances towards abscess? When the devitalizing of an exposed pulp was a common practice, we frequently saw the dentine colored red. The view then entertained was that the blood-corpuscles were broken up, and the hæmatin (the coloring matter of the blood) was liberated and passed into the tubes of the dentine. In former years I have frequently met with teeth colored in this way. In some instances the discoloration would pass off in from twenty-four to forty-eight hours; but in many cases it was permanently fixed. We have merely a hypothesis as to the true cause of this discoloration. I never knew of such a case being subjected to the microscope. Those of you who have seen the circulation of the blood in the web of a frog's foot, notice that the blood-corpuscles do not always retain the spherical form; as they pass along the vessels their figure sometimes becomes elongated or contracted in the center as they pass around the corners, so to speak, or pass from one vessel to the other. At what point in the capillary system the arterial blood is converted into venous, or the arterial blood gives off its nutritive properties, is not known. We know the pulp is abundantly supplied with blood-vessels and nerves. Now, if the line of demarkation found in teeth affected by caries be the product of a deposit of lime salts in the canaliculi, how and by what means are these salts carried to the line of demarkation? Is there any other vehicle but the blood to convey them? Histology is only in its infancy as connected with dental anatomy. To-day we admit of living matter in the dentine, cement, and enamel. With these truths in view, may it not be reasonable to suppose that dental caries in part, at least, is accompanied by inflammatory action.

Every dental operator knows that there is such a thing as sensitive dentine. If he don't, his patient is not very long in informing him of the fact. What is the pathology of sensitive dentine? When our patients ask what is that which hurts so? Oh, sensitive dentine! And pray tell me what sensitive dentine is? Some authors tell us that it depends upon its connection with the pulp, and others that there is a possibility of actual nerve-fibers. If you admit either one of these theories there is a possibility of an artery, for nerves and arteries accompany each other. If you admit the one, I do not see how you omit the other. If you acknowledge both, you must admit of inflammation.

We sometimes meet with cases in which caries has been arrested, and the parts, though dark, have become hard, consolidated, and highly polished. We might ask how this change is brought about. Is it that the vital powers have overcome the destructive agents; if so, has it not been preceded by an inflammatory action? A more common occurrence in practice is to meet with cases in which the teeth are worn down quite to the margin of the gums, and without any pulp exposure, the pulp in these cases having resumed its formative power, and deposited new dentine. This, I think, is due to more or less inflammatory action. In teeth of delicate structure, and particularly those in which the tubes are large, a considerable amount of pain is felt upon the removal of the disorganized tissue. Teeth that have been excavated and their tissue left exposed to the action of the secretions of the mouth, in a short time become painful and highly sensitive to the slightest touch. These are conditions common to inflammation. Pain is frequently felt in the progress of dental caries long before the pulp is exposed. A number of patients are able to tell when their living teeth are decayed from the unpleasant sensation they give. In these, then, do we not have nearly if not quite all the symptoms accompanying inflammation; the severity of its action depending upon the quality of the tissue and the state of the system, whether it be above or below the standard of health. These are some of the reasons which lead me to believe that dental caries is accompanied by inflammatory action.

The following lecture, entitled "Is Dentine Vital after the Death of the Pulp?" was delivered by Professor T. L. Buckingham, of Philadelphia:

Gentlemen.—One of the greatest difficulties we have to contend with in investigations of this kind, is the fact that we cannot commence at the bottom. If we could see through these tissues as in a retort, we might form some rational idea of what was taking place there.

The first question which naturally presents itself is, What is Life? This has not been satisfactorily answered yet. It is a difficult thing to tell just when a certain tissue changes from a living to a dead one. The lowest form of organized matter was supposed to be the cell, but now some physiologists say these cells are made up of molecules which, they say, are still lower forms of living matter; but it is not certain that they can demonstate this clearly, and so we conclude the cell is the lowest form in which living matter exists. All tissues are made from cells, and these cells from the aggregation of molecules, and these again from atoms.

Now, what is a cell? Beale says, "a cell is a mass of germinal matter surrounded by formed material." The only difference observable between the two components of a cell is that the germinal matter is colored red by carmine, while the formed material on the periphery is unstained. In woody fiber, when the cells are once formed, they remain in a passive state. The cell in animal tissue is first made up entirely of this germinal matter, which may be colored red by carmine, and after a time it becomes hardened upon the outside, and still later it will split up and reproduce several young cells precisely like the original or parent one. All the cells in the body are supposed to contain a portion of this living or germinal matter. When the cells become dead they are about to be thrown off as they are on the surface of the skin. If we commence at the deeper layers of the skin, we will find the matter, which will be colored red, contained in each cell, getting smaller and smaller toward the outward surface, until on the surface scarcely any part of the cells are colored. I call attention to this because the teeth undergo the same changes, passing through a cartilaginous state before calcification. They are at first a fluid, and then changed into cartilage, this becoming hardened, and then deposition of lime-salts takes place. These salts do not add anything to the life of the tooth. This intercellular or intertubular structure bears the same relation to a tooth that the woody deposits do to a tree. It remains there as long as the tree continues to grow. It has passed through its living state, and now becomes formed material. It is not necessary for it to have much vitality in a tooth, and if there is living matter there it is contained within these tubuli. It was thought that these tubes were open, but now they have been demonstrated to be filled by a semi-solid.

While the pulp is living, there is no doubt that the dentine is nourished, and that it gets this nourishment from the fluid constituents of the blood. The fluid does not pass through in a stream, but moves slowly, just as water would go or soak through a piece of wood. I believe this fluid, or liquor sanguinis, which nourishes these solids passes through in every direction without regard to the tubuli.

The intertubular matter is made up of lime-salts and an albuminous substance which acts as a cement to hold the lime-salts in position. For illustration, we take some corundum and mix it with shellac. The shellac holds the corundum in place and fills up the spaces between the particles. So it is in the intertubular structure of a tooth; you have this gelatinous matter impregnated largely with water, which the lime salts displace to a great extent. If you just suppose that these molecules of water have been displaced, and that these lime-salts have taken their place, you have an idea of what takes place. Primarily the dentinal cells are formed on the outside of the pulp, and are composed wholly of germinal matter. The outside of these cells becomes hardened, and the germinal matter is pushed toward the pulp. They continue to grow in this way until long tubes are formed, the germinal matter occupying the center, and the walls of these tubes, composed, as they are, of formed material, become impregnated with lime-salts. In this way I think the dentinal tubule is formed of one cell and not from a number of odontoblasts produced by the pulp.

There is no doubt there is a fluid passing through these cells, for, as Dr. Beck says, there must be some change going on in them. All living tissue has circulation in it.

Now, when these cells or odontoblasts are cut off by the death of the pulp, will they keep up their vitality? Will sufficient nourishment be sent there to keep them alive, or will they be nourished through the cementum from the pericementum upon the outside? The best way of determining this is to ask whether there is any sensibility in the dentine after the pulp is devitalized? Is the sensation sometimes felt in dentine, after the death of the pulp, due to sensitive dentine proper or merely to mechanical irritation, as is the case when an instrument touching the enamel is immediately recognized? If the pulp be removed, does that portion of the dentine change? Does the dentine become consolidated after the pulp is destroyed, as it would if the pulp had remained intact? We know that while the pulp is alive the tooth gets denser and denser from the deposition of these lime-salts from time to time, and, what is more, these lime-salts may become dissolved away and the tooth-structure deteriorate, and, consequently, be more exposed to the action of decay. But we must bear in mind that this deposition of salts is merely mechanical, and when these salts in solution are carried into the cells there is a change, and the salts are precipitated. By some abnormal change in the fluid the salts may be dissolved and removed. For, as in a battery we may precipitate a substance, and by a little change the precipitate will again be dissolved, so in the teeth. So, if the circulating fluid should become changed, it may carry some of these salts away. I do not say that it will carry the whole of them away, but may carry a portion. My impression is that this germinal matter in the tubuli is destroyed when we destroy a pulp. And I think the tooth is then like a piece of wood or the interior of a tree which remains in a passive condition. If the dentine is in a healthy condition at the time of the death of the pulp, I think that it will remain in that passive condition. Where you destroy a pulp I think you destroy the vitality of the tooth down as far as the gum. You certainly destroy the odontoblasts. Now, if you destroy the vitality of wood when in a healthy condition, it will keep for a very long time; but if you let it grow until it begins to degenerate it will not last long. So in the teeth. The decay which is going on there loads the fluids with degenerated matter, which is then carried through the structures of the tooth, vitiating the whole of it.

Dr. Beck spoke of the barrier of lime-salts against decay. The deposition of this barrier of lime-salts is induced by a certain amount of irritation in the dentine, and, as a result of the inflammation thus set up, this barrier is thrown out to prevent the decay encroaching further upon the pulp. If the other parts are in a healthy condition, decay will probably continue no further, but the trouble is that decomposition of the fluids of the mouth is all the time going on in the cavity already formed, thus being a constant source of the elements of decay. If we excavate this cavity and fill it thoroughly, the decay will cease. Just the same as in a tree where, if you cut a hollow in it and allow dirt and water to collect in it, decay will take place; but if all the decayed portion be removed and the place filled with something that will keep out the water, decay will be arrested. I believe that the decay of the teeth may, to a great extent, be studied by the decay of the tree, and I believe that the effects are about the same. I believe that after the destruction of the pulp the upper portion of the tooth is dead, but as to the lower I do not say.

Discussion.

President Peirce. There was a query brought out by the paper concerning the irritation caused by the decay of the teeth, which was not fully answered. We know that when irritation is set up in a tissue there is an effort on the part of nature to prevent its spread by placing a barrier around it. Take, for example, the trichina, which, as soon as it becomes quiet in a muscle, is encysted, and there it remains during the life of the animal. The method of producing pearls by putting dense substances in the shell of a bivalve to incite inflammation, by means of which a deposit of lime-salts is induced, is another instance of an effort of nature for protection. We must recognize a certain amount of vascularity in these dense tissues. In the dentine it is well exemplified, for you cannot produce an impression upon it without having an effort on the part of nature to place a barrier around the point of lesion, and thus protect the remaining dentine and pulp by virtue of the irritation caused by the foreign material, precisely the same as in the trichina and oyster. When caries attacks the enamel the vascularity is so low that there is no appreciable change in the surrounding parts taking place, but as soon as the disintegration reaches the dentine, nature recognizes its presence and throws a barrier out to protect the surrounding healthy tissue.

Dr. Buckingham said, we have running throughout this tissue protoplasmic strings, and he said, further, that the liquor sanguinis which went to nourish the substance of the teeth passed through or circulated in all directions. Now the law of all fluids is that they pass in the channels of least resistance, so I believe the liquor sanguinis passes through in every direction, for the lime-salts are simply held there in position by a matrix of animal matter, and if you dissolve out these salts you will still have this matrix left. As an evidence that these fluids may circulate in every direction you may thoroughly dry a tooth and immerse it in water, and absorption will rapidly take place. The tubuli are necessary as a source of nourishment to the teeth. This intertubular tissue is not dead matter, but it needs the liquor sanguinis to pass through it to solidify and keep it in a healthy condition. If we examine a person in middle life we will find the teeth to contain more solid matter than in young subjects. They follow the same law that the bones do, becoming more indurated as the age of the person advances.

I understood Dr. Beck to say motion was an evidence of life. I think he is mistaken there, for if we divide inorganic matter fine enough we will have it in constant motion. So we have motion in inorganic as well as in organic matter. The line of division between organic and inorganic matter is so obscure that it is almost impossible to recognize it. In many cases it can be done only by watching the subsequent changes that take place. What life is has never been satisfactorily explained, and it is still an open question whether it is a force which is independent of matter or not. Dr. Buckingham said the cell was the lowest form of life; but we go beyond the cell to get to the bottom; the cell being composed of granules, or what Hæckel styles plastodules, and these in turn of atoms. First, the aggregation of atoms forms the plastodules, and these again, aggregating, form the cell. We have the changes in structure brought about by the multiplication of these cells, and this is the part so difficult for us to comprehend. It depends quite as much on the pabulum which the cells receive as it does upon any inherent force. Our knowledge of the development of the structures is indeed limited.

Dr. Buckingham. That we have atoms, without change, aggregating and forming molecules and these forming cells, I have no doubt, but whether living matter can reproduce itself without the change taking place in the cells themselves will admit of strong doubt. The question is, Can these divisions of matter below the cell reproduce themselves? I do not believe these granules or plastodules can any more than the atoms can, and so I believe the cell is the lowest form of matter that will reproduce another of the same kind. One cell we know produces another just like itself, and we reason that one of these cells is made up of millions of small particles of matter, and these coming in contact form the cell; but if you take one of these granules and put it by itself will it grow to be a cell after while? Now, the doctor said these tubes in the dentine were filled up with protoplasm, but I differ from him. I think the protoplasm was the first formed material that filled them, but that afterwards it was changed from this.

I think this gelatinous matter composing the intertubular tissue holds a large quantity of water, and that some of these molecules of water are replaced by lime-salts, and that these salts may be redissolved and water again take their place. Water is one of the most incompressible substances we have.

Dr. Roberts. The president spoke of motion in dead as well as in living matter. I would like to ask him whether there is not a difference in the motion; whether it is merely vibratory or whether it has an object in view?

The President. The motion is similar under similar circumstances.

What is known as the Brownian movement is no evidence of life. As Dr. Buckingham has said, it is difficult to say whether these granules have the power of multiplication or not. So we say the cell is the lowest division of a living tissue.

Dr. Buckingham. There must be a limit to the divisibility of living matter, so that each particle will contain sufficient vital force to reproduce itself. If we assume that the atoms are living bodies, then all substances must be endowed with vital properties.

Dr. Beck. You recognize that we have protoplasmic strings filling the tubuli of the dentine, and that they pass into the canaliculi of the cementum; now, if they pass in there at all they must have some object in view. Here is a pulp represented as containing veins; now, we might ask what the vein is for. Is arterial blood changed into venous blood during its passage through a tooth?

The irritation produced by the encroaching decay causes a barrier to be thrown up, which is a true line of demarkation between the healthy and the unhealthy parts. I do not see that these lime-salts are going to get away from these odontoblasts. Do they go in simply as a fluid? If they do, there must be some kind of irritation that induces nature to reproduce itself. If we lop off the branch of a tree nature soon closes round the injured part and envelops it; or if we place a piece of metal in the crotch of a tree, in a year's time it will be entirely covered. Now, if decay is a disease, nature tries to get rid of it, because the tooth is a living organ; but just what these protoplasmic strings hold we have yet to find out. We do not know why they are produced; we simply see them, and that is all. If irritation is set up in the dentine, a barrier is thrown up between it and the pulp; and if the destructive agent is powerful, it will break down the first barrier, and then another is immediately thrown up. If I understand Dr. Buckingham rightly, he thinks that this dentine may throw out more dentine from the orifice of the point of exposure, and gradually bridge over the exposed pulp, and also that we might puncture the dentine around the exposure, as a surgeon punctures a bone, and thus induce irritation enough to cause a deposit of dentine to take place.

When a pulp is devitalized, I do not think a tooth is dead, only to a certain extent.

The tubuli of the dentine are almost analogous to the Haversian canals in bone and the lacunæ of the cement to the bone-cells; so I think there is not very much difference between teeth and bone.

Dr. Buckingham. I think all these bodies receive their nourishment in a fluid condition. Colloid substances will not allow colloid substances to pass through them, but will allow of the filtration of crystallizable substances. The changes take place in the cells themselves. The nourishment does not come from capillaries, but takes place in these small cells by the fluid circulating around them. They are all nourished by the same fluid, and yet some will secrete lime-salts, some milk, and others bone, etc. Each one has a part of its own to perform. All these things go to them in a fluid condition, and yet different cells extract different materials from it. I believe these odontoblasts grow from the formed materials. Tomes says the pulp is changed into dentine, but we find no tissue in the body changed directly into another.

Dr. Beck. If the cells are to reproduce nerve, they take from the blood those materials that are required in making nerves. We admit all that, and this fluid must contain these materials. Now, how does this fluid get back into the veins after circulating around the cells and depositing what they require?

Dr. Buckingham. If the doctor will tell me how the sap circulates through a tree, I could tell him. We have two currents of sap, an ascending and descending, and yet they do not mix, although they apparently go into the same cells. There is a change in the blood after circulating among these cells, and it is supposed to be due to carbonic acid absorbed. We cannot tell just where the change takes place; it passes in in one condition and comes out in another. There is something very peculiar about the nutrition of the human economy. The food taken into the stomach is converted into a fluid, which always has the same chemical composition; and the same way with the blood,—its chemical composition remains about the same.

President Peirce. If this is the case, why can we not live upon one food? I think the blood varies in different conditions of the system.

Dr. Buckingham. That's the question. The blood may vary in the quantity of water contained, but with this exception the chemical composition remains unchanged.

I suppose irritation is an excited condition of the tissues. It is an excited normal condition, and may be pushed to an abnormal condition.

FIRST DISTRICT DENTAL SOCIETY.

A meeting of the First District Dental Society of New York was held February 4, 1879.

Incidents of Office Practice.

Dr. Mills. I had a case on Saturday last that was interesting and also aggravating. I was called upon at my office about ten o'clock to attend a lady patient, about twenty-eight years of age, who was suffering, and who had been confined to her bed for about five weeks. She had difficulty with the first lower molar on the right side. There was quite extensive decay, exposing the pulp. A good many efforts had been made in different ways to relieve her, and finally an oxychloride of zinc filling had been inserted. The result was a case of periostitis and death of the pulp. The tooth was red-hot (so to speak) with inflammation; she could not bear to touch it even with her tongue; she was badly demoralized and had had several convulsions; she was not able to sit up at all. It was against my judgment to extract the tooth under the circumstances. I had my assistant bring an engine, and drilled through the buccal surface, then made a gutta-percha cap and put it on the adjoining teeth to prevent occlusion with the tender tooth, and gave her a dose of wine of opium. In less than two hours she was relieved entirely, and has been free from pain up to this time.

The subject of the evening, the "Treatment of Pulps," was then discussed.

Dr. J. S. Latimer. I have nothing new to offer on the question of treating pulps. My treatment is simply dressing with carbolic acid, cleansing the cavity, not exposing the pulp (removing all the affected dentine would expose it), and drying thoroughly. I wish to say in reference to drying the cavity, that I find absolute alcohol a convenience, because it combines so readily and rapidly with water. Two or three applications of alcohol successively, each time absorbing it, and then the hot-air syringe, then carbolic acid, and you get the parts about as nearly dry as you are likely to in the time that can be given to it. The dentine will then absorb the carbolic acid, which will not kill the pulp; it ought to, but it does not. I have tried it over and over again, and have not found that it devitalizes the pulp. I frequently interpose a little shred or shaving of gutta-percha; and where gold is to be put over it, I cover the dentine itself with a concave cap of platinum. If there was no dentine between I should use some powdered material; it would not make very much difference whether it was chalk or oxide of zinc, but oxide of zinc is always convenient, so I use that. I do not cap pulps that are in a perishing state. I have treated and restored pulps to health that are living yet, though done five, six, and seven years ago; but as a rule it does not pay,—it is not best. I wish to say in respect to the matter of devitalized pulps and the danger of not getting all the dead pulp out, or when it is found dead, the difficulty of cleansing out the canals and getting any filling material in them, that the alcohol again comes in play, enabling us to remove any pus or other substance, and it also assists in getting varnish into very fine and tortuous canals, which, so far as I know, is a great deal better than to leave them empty. Certainly it has answered very well as far as I have tried it. The canals must be dry first; if there is any moisture there will be a precipitation of the gum from the varnish.

Dr. Clowes. What was the cause of the inflammation in the case of which Dr. Mills has spoken? There is no mistake but that that was a tooth as near ulceration as could be; it was incipient ulceration at least. Drilling into it was the proper thing to do. If there had been pus in there and it had discharged freely, that would have produced relief itself. The opium might soothe the nerves, but the mere opening of the tooth and giving vent to the gases was the thing to do; many and many a time I have treated cases of that kind. I think there was incipient ulceration there.

Dr. Atkinson. Whenever you have a tooth of that kind where there is pericemental congestion, put a strong cord around it and tie it tightly, then pull, or have the patient pull on it until the pain ceases, then open into it.

Dr. Dwinelle. A few days ago I had occasion to undertake to save a superior left wisdom-tooth; it was very much decayed, it was a mere shell, and yet I desired to save it. I excavated it with great care, and just as I was about to conclude my operation I found a little decay in a portion of the tooth quite remote apparently from the pulp-cavity. In fact, it was situated up in a corner of the tooth, near the crown surface, and I said to my patient, "Permit me to remove this little portion of decay; it won't hurt you at all." In removing the decay I exposed the pulp, and he jumped almost out of the chair. It was one of those cases where one angle of the pulp had projected itself very near the surface. After using a good deal of persuasion, my patient took a seat in the chair again. I found the pulp bleeding; I let it bleed a short time, and then treated it with alcohol, dried it out several times, and applied carbolic acid, with oxide of zinc. I concluded—thinking that unless I operated all that I could that day I might not get another opportunity very soon—to cap with oxychloride of zinc. My idea was simply to cap it with a small portion of oxychloride of zinc, produce as little irritation as possible, and resume operations at another time.

Finally I thought I would fill it up entirely, even if I had to cut it away the next day. In doing so I applied so much of this material that the irritation was excessive and the pain intense. I applied one remedy after another. I went through the whole category of sedatives, but I finally induced relief in this manner: I applied tincture of aconite to the gum around the tooth, upon a little bit of cotton, protecting it with paper so it would not extend to the cheek. I went on with this dangerous treatment until I succeeded in subduing the pain entirely. I then gave him fifteen drops of elixir of opium, and went home and remained with him, and was gratified next morning to find that there was no trouble whatever. I have examined the tooth since, and am perfectly satisfied that the pulp is alive.

Dr. Clowes. That is a most extraordinary confession, but still good for the soul. Only think of it! If the doctor had just mixed a little plastic with a little creasote,—a third perhaps,—to two-thirds of chloride of zinc, he would not have had any pain at all, and he could have filled over it; but now there is not the least certainty that that tooth is going to behave itself.

I am going to tell you about a case that I had lately. It was a molar on the right side, lower jaw,—a shell; the top was all gone. Now, I wanted not only to save that shell, but I wanted to build up a tooth on it to meet a molar on the upper jaw. The nerve was almost bare,—the slightest touch would give pain. I thought the first thing to be done was to make a safety-pocket and devitalize the pulp. The patient was a gentleman living in St. Petersburg, and I ought to have done the very best thing for him, because if anything happened he could not come to me to get relief. But recollecting what has been said about destroying pulps, I filled it and built it up without devitalizing the pulp; but when I come to think it over that was not the best thing to have done. That man wanted a good permanent masticator. What was the best way to get it? There was a shell, liable to break, then of course my top would tumble off. I ought to have destroyed that pulp and put two screws in the root, and built up my crown, and then we would have had one of those positive things that there is no doubt about. Under similar circumstances let me advise you to devitalize the pulp, get the very best hold you can, and make a permanent operation.

Dr. Mills. Dr. Dwinelle's case has reminded me of a case I had on Friday last. The patient was a lady; upon examining the tooth I found quite an extensive decay, but went to work with certain confidence that I should fill the tooth, and proceeded with the idea of doing so at once. The dentinal layer was very thin over the pulp. Why I did so I do not know, but I allowed myself to go on and apply the oxychloride of zinc without previously applying creasote. I then filled the tooth. The filling had not been in there half a minute before there was a complaint of pain; pretty soon I saw the tears begin to start. Thinking that perhaps I could control the pain, I covered the cavity with the rubber and gave her some wine of opium; but the pain continued, and I removed the filling; then made an application of salicylic acid, which had no effect; I then tried oil of cloves and creasote,—that had no effect; then I had recourse to chloroform, and hoped it was going to control the pain, but it did not; and finally I went back to the oil of cloves. After a while the pain began to lessen. I took the rubber off, and she went home. She came back the next morning. I found the cavity was exceedingly sensitive. I dried it out with alcohol, then put in Hill's stopping, filling all around the sides, and not packing it over the exposed parts. My patient went home perfectly comfortable. That was a case where I allowed myself to deviate from my usual habit of putting on that application which might perhaps have saved me trouble.

In regard to the use of aconite around the necks of teeth, I never hesitate to use it, so far as the danger is concerned.

Dr. Clowes. This seems to be a kind of confessional meeting. Another gentleman has sat down after confessing to causing a great deal of pain very unnecessarily. I hold this is not the right thing to do. Patients have pain enough generally of their own without having it produced; but if a dentist does produce it, he ought to know how to control it at once.

Dr. Mills. What do you do to relieve pulp pain under any circumstances?

Dr. Clowes. There is one sovereign remedy,—arsenic and creasote.

Dr. Dwinelle. Why not put in three or four screws removed as far as possible from the pulp-cavity and save the pulp alive?

Dr. Clowes. You could not get the patient to hold still long enough.

Dr. Dwinelle. My two front teeth are built, from the gums down, with gold, and they have screws in them, and the pulps are living. You can put in a molar tooth four screws down to the bottom of a large cavity with perfect impunity and not impinge upon the pulp.

Dr. Clowes. I tell you that a dead tooth is often far better than a living one. I showed our friend from London here to-day a case of a girl fourteen years old; she had the twelfth-year molar and the sixth-year molar developed. I did not think proper to take out the sixth-year molar. The teeth were close together. I examined them one year: they were sound; another year I ran an instrument between them and found a large cavity. I said, "We must have room here;" but the kind of separation that would be useful I could not get and save both the teeth alive, because the patient could not bear the cutting; so I said we must devitalize the pulp of one of the teeth on each side, so that we can obtain space by cutting. I destroyed the pulp of the sixth-year molar on both sides, and cut away and filled the teeth. I consider the operation a success.

Dr. Brown. I have a little girl here that some of you have seen. She has in her mouth an illustration of the principle of capping which I have advocated for several years. I use a little disk of ivory, ranging from the size of a small pin-head to the size of a split pea.

When I find an exposed pulp I take into consideration the chances of saving it. This case of a temporary molar was badly exposed,—as large as the head of a pin. I capped it with ivory and placed oxide of zinc over it. The minute the cap was over it the pain ceased. Upwards of seven years ago I came across a set of beautiful teeth in the mouth of a gentleman of about thirty-five years of age. His teeth were almost perfect, but I found the pulp of the left lower bicuspid exposed,—it bled some. I had worked with all the materials that we ever used for capping, and I had no confidence in any of them. So I took a little piece of ivory, filed out of a root of a sound tooth, and placed it over the pulp.

As soon as the ivory cap was placed there was no more pain. I filled the tooth with gold. That operation gave me a good deal of encouragement, and I have been capping a good many pulps in that way. You can get it as close—and not too close—to the pulp as any material I know of. For seven years I have capped pulps in this way every week. I have lost several cases,—three or four,—but they were such as I would not try again to save.

Dr. Atkinson. I will say a little on this subject of capping pulps of children. If I emphasize the preservation of adult teeth I would intensify the emphasis for children's teeth, for the very reason that the process of solution and absorption of the roots is arrested the moment the pulp is killed. By all means save the pulps of children's teeth alive!

Dr. La Roche. I have spoken before about saving exposed pulps with gutta-percha and tin over it. I have saved more exposed pulps in that way than in any other that I have tried. I have had quite a good deal of experience for four or five years in capping pulps, and I can say that I have made no failures where I was sure that the pulp was not inflamed or diseased before I commenced. I have some cases that I feel very proud of. I use gutta-percha first and tin over it, filling afterwards with gold. It requires nice manipulation of course. I take a very small piece of gutta-percha, which makes a very thin film, first having it warm so it will be very plastic. I have a peculiar soft gutta-percha. I pick it up with a very sharp-pointed instrument; if a blunt instrument is employed it cannot be detached very well. Before treating a pulp that is exposed I touch it with creasote and oil of cloves. If there is bleeding, I touch it with creasote alone, and afterwards with a little oil of cloves, and then dry it well without irritating the pulp. If I should produce any pain in laying the gutta-percha over the pulp, I should at once take it out and try again.

Dr. Mills. It is my belief that much of that which is said about exposed pulps relates to pulps which are *almost* exposed. It is a very different thing to treat teeth with pulps almost exposed and those that are actually exposed. The case of Dr. Brown would indicate an exposure of the pulp, because he could see the pulp. But statements about such an immense number of exposed pulps indicate blunders in exposing pulps, or else mistakes about their being exposed.

Dr. La Roche. I think Dr. Mills is perfectly correct in saying that many are incorrect when they say the pulp is exposed. But where you can see the pulp you may be certain that it is exposed.

Dr. Atkinson. For the information of any one who thinks that an exposed pulp has never been healed, I will exhibit to him a tooth, and submit to his judgment whether it is living or not. Some thirty-five years ago, in excavating to fill, I cut off the outer horn of the left superior bicuspid and it bled; I capped it with what I was then using,—gold plate. Some years afterwards, I did not like the looks of the filling and took it out to refill, having forgotten the condition in which it was, until, in the removal of it, the piece of plate fell into my hand. I had an opportunity then to examine the point, and I could see no difference, with a glass, between the primary and secondary dentine.

Dr. S. G. Perry. In the matter of exposed pulps there are several things to be taken into consideration before we can decide what course to pursue,—the age of the patient, size of the exposure, and condition of the pulp. I would try to save largely exposed pulps for some, and for some I would devitalize them at once. For a youngster I would expect to save a pulp which I would not expect to save for an older person. If we thoroughly clean and fill the canal of the root I do not think there is much danger of loss of a devitalized adult tooth. As to Dr. La Roche's method, it seems to me that it is not quite founded on correct principles. With gutta-percha, even with tin foil over it, there is not that rigid condition over the pulp which would make us feel quite certain of protecting it from pressure. It may do over a slight exposure, but will not be tolerated by a largely exposed pulp. I am quite ready to say that I do not hesitate to destroy exposed pulps, almost the whole profession to the contrary notwithstanding. It is a bold statement to make, and there is some danger of my being misapprehended. It is not right to fill over exposed pulps permanently and let them go. It may be thought that I am too cautious; but, after removing the filling a year later, if I find that the breach has been closed, I know then that I have a safe tooth. If I find it has not been closed, I can put it in the same condition again and no harm will be done. Certainly in my own mouth, even under the care of the nicest hand that could be brought to the task, I should not care to have an exposed pulp capped and a large gold filling put in, because a cavity that is large enough to expose a pulp will need a good deal of work upon it and a very large filling,—a condition of things in every way unfavorable.

Dr. J. S. Latimer. The plan that I have been practicing for several years has not been mentioned: simply making a little cap of gold or platinum by using the reversed end of a punch, and stamping out a little disk, making a concave surface, filling that surface with gutta-percha dissolved in chloroform, and on the convex side of the little cap placing a little wax or resin so as to make an adhesive surface. Touch the instrument to the adhesive surface after treating the exposed pulp with creasote or carbolic acid; carry the little cap to its place, and then by a little lateral motion, with no pressure except the weight of the instrument, settle it into position. The chloroform will evaporate very soon, and the gutta-percha will ooze out, if there is any excess of it, while it is quite thin, and in a moment it will harden; then fill over with the gutta-percha; then scrape off the wax, which was merely for the convenience of putting it into place. The chloroform and gutta-percha, I imagine, tend to allay pain. With that plan I have been very successful indeed, and especially successful with children's teeth.

Dr. Brockway. We have had described to-night a number of methods of capping and saving pulps. They are all good. It is possible that some may be better than others. I think experience has shown that living pulps under favorable conditions can be saved by any one of the methods which have been described. But in my judgment it is not advisable to attempt the salvation of pulps in every instance. I formerly believed and practiced differently, but my practice now is in harmony with that described by Dr. Perry.

In the mouth of a young person I should make efforts to save a pulp alive that I should consider unnecessary in the mouth of a middle-aged or old person. The pulp is a useful part of a tooth, but its use diminishes with increasing age, and experience has shown that it is not essential to the comfort and the salvation of teeth. I have in my own mouth not less than four pulpless teeth. I know that the pulps of two of them—upper bicuspids—were removed by Dr. Wescott as long ago as 1856. Those teeth have never given me a moment's uneasiness. They are to all intents and purposes as sound as any teeth in my mouth. My experience is not singular; we see teeth every day from which the pulps have been removed for years,—fifteen to twenty and forty years. So that in cases where the difficulties of saving the pulp are great, and the chances of its ultimate salvation few, I hold it is the proper thing to apply arsenic. I quite agree with Dr. Clowes in his judgment as to the case which he related. I think he was unwise in his treatment of that tooth. He should have devitalized that pulp and made a certain thing of it. There is a little article that I have not heard alluded to here to-night that I have found very useful in the treatment of exposed pulps,—a preparation of Canada balsam and chloroform. It is extremely useful. I have capped many pulps with it, varnishing it over the exposed pulp, and then filling with oxychloride of zinc or with gutta-percha, and have had as good success as in perhaps any other way.

AMERICAN DENTAL ASSOCIATION.

The local committee of the American Dental Association report by their chairman, Dr. George L. Field, the following provisions for the nineteenth annual session of this association, to be held at Niagara Falls, August 5, 6, 7, and 8, 1879.

The meeting will be held in the pavilion in Prospect Park. Each person attending will be charged one entrance (25 cents) to the park for the session. Hotel charges reduced to $3.00 per day at the Cataract House and International Hotel.

Half rates to all places of interest in the vicinity, one ticket good for the session. Certificates entitling members to reduced rates over the Great Western and Wabash Railroads may be obtained of Dr. George L. Field, Detroit, Michigan, previous to August 1. Reduced fares over the Erie and New York Central Railroads can be had after July 15 of Dr. F. M. Odell, 7 West 38th Street, New York.

The Cincinnati, Hamilton and Dayton and Canada Southern Railroads will issue tickets from Cincinnati to the Falls and return for $10.00.

Thomas Fillebrown,
Chairman First Div. Executive Committee.

THE AMERICAN DENTAL CONVENTION.

The American Dental Convention will hold its 25th annual convention in Saratoga on the second Tuesday (12th) of August, 1879. The committee have made arrangements by which members will be entertained at reduced rates at the United States Hotel.

Provision has been made for the exhibition of dental materials, appliances, etc., etc. Manufacturers and members are invited to exhibit, etc.

The profession generally are invited to attend this session, which is expected to be one of more than usual interest.

All respectable practitioners are eligible to membership.

For further information, address J. G. Ambler, 25 West 23d Street, New York.

J. G. Ambler,
John Allen,
L. S. Straw,
C. F. Rich,
Committee of Arrangements.

PENNSYLVANIA STATE DENTAL SOCIETY.

The eleventh annual meeting of the Pennsylvania State Dental Society will be held at the Delaware Water Gap, on July 29, 30, and 31, 1879.

Ample arrangements are made for the accommodation of all who may be present at the meeting. Hotel rates, $2.75 per day.

Essays and Clinical Operations.

Teeth as Organs of Speech. By Prof. C. N. Peirce.

Review of some of the Causes for Losing the Teeth in the Adult. By Prof. Charles J. Essig.

The Electro-Magnetic Mallet as an Aid in the Performance of Dental Operations. By Geo. B. McDonald, D.D.S.

A paper on Dental Materia Medica. By Prof. S. B. Howell.

Clinics on Wednesday, from 9 A.M. to 2 P.M.

In the space left through the loss of an upper lateral incisor tooth will be placed a crown of gold, faced with porcelain, and the whole attached by a gold wire, and permanently secured to the adjoining central incisor and cuspid with gold foil impacted by the aid of the electro-magnetic mallet. By Marshall H. Webb, D.D.S., Lancaster, Pa.

A left upper lateral incisor, porcelain front (where the root is absent), will be attached with gold foil (by the aid of the electro-magnetic mallet) to an almost entire gold crown, which has already been built upon the root of the left central (which crown now helps to support a right central, porcelain front, where the root is missing), and to the left cuspid tooth. By Geo. B. McDonald, D.D.S.

The restoration of the contour of a tooth by the aid of the electro-magnetic mallet. By Jacob L. Baker, D.D.S., of Coatesville, Chester Co., Pa.

C. S. Beck,
Chairman Executive Committee,
Wilkesbarre, Pa.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The ninth annual meeting of the South Carolina State Dental Association will be held in the office of the president, J. B. Patrick, D.D.S., on the 7th July, 1879, at 10 A.M., in Charleston, S. C. That afternoon the association will adjourn to meet in joint session with the National (Southern) Dental Association, North Carolina State Dental Association, and Georgia Dental Society, next morning, July 8, at Augusta, Ga.

The State Board of Dental Examiners will meet at Charleston, in the office of Dr. J. B. Patrick, on 7th July, 1879, at 10 A.M. Candidates for the practice of dentistry in South Carolina must apply, at or before that time, to Dr. W. S. Brown, of Charleston. The attention of graduates in dentistry subsequent to February 23, 1875, is called to Sections 3 and 7 of an Act of the General Assembly, to regulate the practice of dentistry in this State.

G. F. S. Wright, *Recording Secretary.*

NEW JERSEY STATE DENTAL SOCIETY.

The New Jersey State Dental Society will meet in convention in the Sea-Side Chapel at Long Branch, Wednesday, July 16, at 10 o'clock A.M., and continue in session until Friday.

Headquarters at the Ocean House. Dentists in this and other States are cordially invited to meet with us.

C. S. Stockton, *Secretary.*

Newark, N. J., June 16, 1879.

IOWA STATE DENTAL SOCIETY.

The seventeenth annual meeting of the Iowa State Dental Society will be held at Clear Lake, commencing on Tuesday, July 8, 1879.

E. E. Hughes, *Recording Secretary.*

KANSAS STATE DENTAL ASSOCIATION.

The eighth annual meeting of the Kansas State Dental Association meets at Fort Scott, Kansas, commencing August 5, 1879.

William H. Shulze, *Secretary.*

BIBLIOGRAPHICAL.

A Treatise on Therapeutics, comprising Materia Medica and Toxicology, with Especial Reference to the Application of the Physiological Action of Drugs to Clinical Medicine. By H. C. Wood, Jr., M.D. Third Edition. Revised and Enlarged. Philadelphia: J. B. Lippincott & Co., 1879.

A correct appreciation of the physiological action of remedies must be the foundation for any rational system of medication. The distinguishing feature of the volume under notice is the effort to systematize the principles on which medicines operate, and thus lead to a scientific understanding of the indications of pathological conditions.

The book gives evidence of diligent study of even the most recent contributions to the literature of therapeutics, and of an earnest attempt to present a scientific basis for the administration of drugs. It is beyond question the best treatise on the philosophy of therapeutics yet written.

As a help to an intelligent appreciation of the mode in which drugs produce their peculiar effects on the animal economy, this book is simply invaluable.

This edition, compared with the previous ones, shows a marked advance. Many of the chapters have been rearranged, condensed, or completely rewritten, while many new subjects are carefully and exhaustively discussed. Practically, an addition of about one hundred and fifty pages was made to the second edition, and about fifty pages are now again added.

We conscientiously and earnestly commend the volume to every man who, proposing to medicate the human body, is desirous of knowing *why* he should prefer one drug to another.

American Health Primers.

Messrs. Lindsay & Blakiston, Philadelphia, announce a series of "American Health Primers,"—small volumes on subjects of vital and practical importance,—the subjects treated in as popular a style as is consistent with their nature. Each volume is to be illustrated by engravings when the text requires it. Dr. W. W. Keen is the editor of the series. The authors have been selected with reference to their special knowledge of the subjects treated. The volumes are to be uniform in size,—150 pages, 12mo. Price fifty cents each, in cloth.

The first volume, "Hearing and How to Keep It," by C. H. Burnett, M.D., treats of the anatomy and physiology of the ear; the physics and physiology of sound and hearing; the chief diseases and injuries of the ear, and the general hygiene of the ear in health and when diseased. The book will well repay the studious perusal of the general reader, though it might with advantage have been made somewhat less technical.

The second volume of the series, "Long Life and How to Reach It," by J. G. Richardson, M.D., discusses causes of disease and how to avoid them; heat and cold as causes of disease; contagion and how to escape it; clothing, air, water, baths, food, exercise, sleep, etc. The volume contains many valuable suggestions, which if heeded would doubtless add years of life to the obedient reader.

The Laws of Therapeutics, or the Science and Art of Medicine.

By Joseph Kidd, M.D. Philadelphia: Lindsay & Blakiston, 1879.

This book, "dedicated to the advancement and diffusion of truth," discusses the various medical doctrines which have formed the basis of medical practice from Æsculapius to the present time; devotes a chapter to physiology, another to pathology; considers the natural history of disease and the philosophy of therapeutics; compares and contrasts the laws of similars and contraries; studies the obstacles to the action of medicines, the law of counter-irritation, galvanism, hydropathy, and food.

The author seems to have made an honest and earnest attempt to observe Nature's methods in the cure of disease, to find the laws which must be recognized if success is to be expected as the result of medication, and to contribute towards simplicity and exactness in medical practice, and his book is well worthy careful study.

HINTS IN THE OBSTETRIC PROCEDURE. By WILLIAM B. ATKINSON, A.M., M.D. Second Edition. Rewritten and Enlarged. Philadelphia: D. G. Brinton, 1879.

In the volume before us an attempt is made to embrace in one hundred and sixteen pages the essentials of the obstetric art. It is a concise and plain presentation of normal parturition and its management; of various complications which may arise, and of the methods of dealing with them.

OPHTHALMIC OUT-PATIENT PRACTICE. By CHARLES HIGGINS, F.R.C.S. Second Edition. Philadelphia: Lindsay & Blakiston, 1879.

This a convenient little volume for those—such as the general practitioner—who desire to know the symptoms and treatment of the most common forms of ocular troubles. The descriptions of the various diseases of the eye, and their management, are tersely and plainly presented.

RHYMES OF SCIENCE: Wise and Otherwise. With Illustrations. New York: Industrial Publication Company, 1879.

The thin volume before us is a compilation of about twenty-five effusions, from Bret Harte, O. W. Holmes, and others, of that peculiar class known as scientific poems. They are good of their kind.

OBITUARY.

ALFRED J. BROWN, Sr., D.D.S.

DIED, suddenly, on May 21, 1879, in St. Mary's County, Maryland, ALFRED J. BROWN, D.D.S., of Baltimore.

DR. BROWN was one of the oldest practitioners of dentistry in Baltimore, having been engaged in his profession in that city for a period of thirty-six years. He was a graduate of the Baltimore College of Dental Surgery of the class of 1853, and was enthusiastically devoted to his life-work. He was of an affable disposition, and his decease is lamented by a wide circle of friends.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

IN examining the fillings of one of my patients, I found several of them very much tarnished,—having the appearance of spring-tempered steel. The cavities had been thoroughly excavated. Can any one give me a reason?—J. W. WEST.

How can liquid silex be restored when it has become thick, and in consequence useless?—D. C. G.

I HAVE a very handsome lady patient whose central incisor is completely blackened by having a steel drill broken off in it by a practitioner, who failed to remove it for fifteen months. Can some brother give me the *surest* and *quickest* mode of bleaching it?—C. L. A.

WHAT is Atkinson's method of bleaching teeth?—C. B. R.

A CASE IN PRACTICE.—I have a patient, seventeen years old, who has been under my charge for three years. As his teeth were very soft and chalky, I filled one—a molar—with amalgam, and the left central with gutta-percha, the right central with cohesive foil, and one with os-artificiel. The teeth filled with amalgam, gutta-percha, and os-artificiel abscessed in the course of a few months. Those I filled with gold are perfect after two years, while all those filled with plastic fillings have given trouble, though the nerves were not exposed and the teeth not more decayed than those filled with gold.

Will some one of the advocates of the "New Departure" please explain the cause of the plastic fillings giving trouble and the gold preserving the teeth without any trouble? I took as much pains with the plastic fillings, and cleansed and shaped the cavities as carefully for them as for the gold.—T. M. ALLEN.

IN answer to "D.D.S.," who asks in the May number (1879) of the DENTAL COSMOS, "Is a licentiate of the Royal College of Dental Surgeons of Ontario, Canada, entitled to practice dentistry under the laws of Pennsylvania?" the following is quoted from "An act to regulate the practice of dentistry in the State of Pennsylvania":

"It shall be unlawful for any person except regularly authorized physicians and surgeons to engage in the practice of dentistry in the State of Pennsylvania, unless said person has graduated and received a diploma from the faculty of a reputable institution where this specialty is taught, and chartered under the authority of some one of the United States, or of a foreign government, acknowledged as such, or shall have obtained a certificate from a board of examiners, duly appointed and authorized by the provisions of this act to issue such certificate."

A licentiate of the Royal College of Dental Surgeons of Ontario would undoubtedly be eligible to practice in Pennsylvania under this law.—W.

NOISES BY THE MOVEMENT OF THE CONDYLOID PROCESSES.—In addition to what E. N., in the April number of the DENTAL COSMOS, writes in reply to

W. H. H. and J. W. C., in regard to this subject, I will try to make it plainer by question and answer.

What is the origin, insertion, and use of the pterygoideus externus?

Answer.—Origin, outer side of external pterygoid plate, from great wing of sphenoid bone and back part of tuberosity of superior maxilla. Insertion, anterior and internal part of neck of lower jaw and interarticular cartilage. Use, when the two muscles act together they draw the jaw forward, but if used alternately they produce a grinding (sound) motion called noises of the condyloid processes.—O. B. L.

W. H. H.'s question in DENTAL COSMOS of August, 1878, being unanswered, J. W. C. asks in the March number, 1879, why it is not. I will undertake to answer it. The queer noises made at times in the condyloid processes in their articulations during mastication are caused by the irregular action of the muscles of the jaw, throwing it partly out of its articulation, and its return to its place with a bumping sound, or, in other words, the under jaw tilts over some projecting point or points, either a tooth or teeth, or a filling.

If W. H. H. or J. W. C. or any other dentist will send me correct casts of both jaws of any such cases they will oblige me, and I will be pleased to render all information in my power towards the remedy, which consists in first finding the point or fulcrum of leverage, and then reducing it.—J. T. CODMAN, D.M.D., *Boston*, *Mass.*

GOLD PLUGS FIFTY YEARS OLD.—Monday, May 12, I examined in the mouth of Hon. Lawrence Vandervere (a patient of mine) four gold plugs—two on the proximate surfaces of the superior central incisors, one on the proximate surface of lateral incisor, and one on the *cutting edge* of the right central incisor (all the teeth on the cutting edge worn by abrasion)—that were inserted by Dr. Arnold, of New York City, in the month of June, 1829. All the plugs were quite perfect, with the exception of the one on the cutting edge of central incisor, which showed very slight signs of disintegration around the labial margin.—E. H. BOWNE, *Rocky Hill*, *N. J.*

MALPRACTICE.—The suit of Miss Flora Brooks against Dr. Hiram Todd, for two thousand dollars damages for malpractice, was tried at the February term of the Common Pleas Court, at Columbus, Ohio. The plaintiff's petition averred, and the proofs showed, that in March, 1876, she went to the office of Dr. Todd to have a left lower wisdom-tooth extracted, in consequence of the difficulty attending its eruption, owing to its crowded condition; that, after one or two attempts at extraction with forceps, the tooth was missing, and the plaintiff says she spit out "something hard" into the cuspidor, and told the doctor she thought she had spit the tooth out. He said it was not the tooth, and again took hold of something, probably the process, and continued his efforts to extract. This was repeated from eight to twelve times during a period of thirty minutes, at the end of which time the lady was too much exhausted to walk. She was sent home in a hack. Swelling and inflammation of the inside of the mouth resulted, involving the internal pterygoid muscle. She was unable to open her mouth for over three months, during which time several spiculæ of bone exfoliated through the left tonsil.

In May an abscess opened about two inches below the angle of the jaw, and formed an outlet for a quantity of pus. From this time there was gradually increased movement of the lower jaw until mastication became possible, although swallowing was attended with pain and difficulty. In September the plaintiff again resumed her duties as teacher in the city schools.

At the Christmas vacation, while visiting in Lancaster, Ohio, she felt, as she supposed, another spicule of bone exfoliating in the anterior portion of the pharynx. She applied to J. C. Scott, D.D.S., who, after much difficulty, succeeded in extracting the substance, which proved to be the entire missing tooth, with the transverse process inclosed between the roots. After this time the cure was rapid and complete, and in a month there was a restoration to perfect health.

The testimony established the above facts; and that *lower bicuspid* forceps were used which were not suitable for the purpose; that the tooth was missed during the first two minutes of the operation, and that the spittoon was not examined to find the missing tooth, during the operation or subsequently. An attempt to show that the tooth was a supernumerary was refuted by the existence of the transverse process,—by the marks of forceps upon it, and by testimony that blackberry seeds were found in the cavity in the crown after the tooth was taken out of the pharynx. The theory of the prosecution was that the gum adhered to the neck of the tooth, and was torn from the maxilla, forming a pocket between the internal surface of the maxilla and its integuments, into which the tooth was pushed by the subsequent attempts at extraction. Its presence there so irritated the internal pterygoid as to prevent the opening of the mouth until suppuration relieved the muscle. During this time of intense suffering, life, which was seriously jeopardized, was sustained wholly by liquid food. The tooth made its way slowly downward and backward over the mylo-hyoid muscle to the point of exit in the pharynx, below the palato-glossus muscle.

Hon. George L. Converse appeared for plaintiff, and Messrs. English and Baldwin for defendant. The jury, after being out two hours, returned a verdict of nine hundred and twenty-five dollars damages, and costs for plaintiff. Eleven days were consumed in the trial. Numerous experts, both dental and general surgeons, were examined. All the testimony pointed to the theory of the plaintiff as the correct one. The judgment was promptly paid.

This case is the only one of the kind known in medical jurisprudence. The only analogous case is one reported in the *Detroit Review of Medicine* for February, 1877.—J. H. Warner, D.D.S., *Columbus, Ohio.*

The Vulcanite Patent Case—Decision of Judge Hagner.—The General Term this afternoon pronounced a judgment in the rehearing of the case of the Goodyear Vulcanite Company *vs.* Brightwell and others, which has attracted great attention among dentists both in the District of Columbia and Baltimore, as similar suits are pending against Baltimore dentists. The Vulcanite Company claimed that all the processes by which teeth are set in rubber are infringements of patents owned by them, and they sought to enjoin the dentists from using such processes without the license of the company, etc. Judge Hagner pronounced the opinion to-day. The court holds that the dentists' use of hard rubber is an infringement of the patent of the Vulcanite Company, but the patent does not cover the dental use of celluloid, and it refuses to enjoin the defendants from using the latter article. The court hold, first, that the plaintiff is entitled to an injunction as to the use of vulcanite; or, second, the use of a plate of hard or vulcanite rubber or other equivalent; and, third, that the use of celluloid is not an infringement of the Cummings patent owned by the plaintiff.—*Baltimore Sun*, May 26.

THE

DENTAL COSMOS.

Vol. XXI. PHILADELPHIA, AUGUST, 1879. No. 8.

ORIGINAL COMMUNICATIONS.

ON SECONDARY DENTINE.

BY C. F. W. BÖDECKER, D.D.S., M.D.S., NEW YORK.

(Concluded from page 359.)

C. Wedl, in his "Pathology of the Teeth," Philadelphia, 1872, accurately describes the new formations of the hard tissues of the teeth. When speaking of the new formations in the pulp-cavity he says, "In these cases there occurs a continuous development of dentine within certain limits, determined by an irritation, and the new layers are deposited in immediate contiguity with the old, and in parts are intimately and organically united with the latter. Dentine of this description, which serves as a protective covering of the pulp, is called 'dentine of repair,' 'secondary dentine,' as is that dentine, also, which is formed in cases of chronic caries upon that portion of the wall of the pulp-cavity corresponding to the carious locality, and projects into the carious cavity in the form of a spherical segment. In the latter cases, also, we find that the new dentinal canals are continuous with the old; there is usually an abundant basis-substance, and the canals are separated by quite wide intervals. A different structure is presented by the concentrically laminated forms, two varieties of which are distinguished,—the simple and complex. Thin cross-sections of these new formations present a central basis-substance, composed, in many cases at least, of transparent, discoid, homogéneous, structureless, nucleus-like masses, either single, in pairs, or in large numbers, around which concentric layers are disposed in a manner similar to those around the Haversian canals in bone. I have met with a few cases only of true new formations of osseous substance within the parenchyma of the pulp. The greater portion of the very common osteo-dentine formations is composed of dentine; the bony substance occurs in a very small quantity, and may consist merely of a group of a few bone-corpuscles. The osseous substance not infrequently attains only a rudimentary development, and resembles that which occurs upon the cement towards the neck of the tooth."

Charles S. Tomes, in his "Manual of Dental Anatomy," Philadelphia, 1876, says, "Secondary dentine occurs in the teeth of aged persons, in which the pulp-cavity is much contracted in size, and also is very frequently formed as a protection to the pulp, when threatened by the approach of dental caries, or by the thinning of the walls of the pulp-cavity through excessive wear." Tomes illustrates secondary dentine filling up one of the cornua of the pulp-cavity from a human molar affected by caries, which figure closely resembles the formation I have described above. Tomes remarks, "It would be impossible to attempt to give any description of the almost endless minor modifications of the dentine structure."

From the facts recorded in dental literature, it is evident that there are several causes universally agreed upon as to formations of secondary dentine. These causes are mainly: first, advanced age; second, caries of the primary dentine; and third, injuries on the external surface of the tooth.

Carl Heitzmann, in 1872 ("Über Rück- und Neubildung von Blutgefässen in Knorpel und Knochen."—*Wiener Medicinische Jahrbücher*), first drew attention to the fact that in old dogs and cats a number of Haversian canals in the compact bone become obliterated. This investigator observed that the capillary blood-vessel, which represents the last remnant of the medullary tissue within the Haversian canals, is finally transformed into a solid protoplasmic mass, which immediately assumes the character of the bony basis-substance. The bone-corpuscles, which under these circumstances are visible in the center of a Haversian system, are as a rule larger than those scattered within the lamellæ of an earlier formation.

If we consider the pulp-cavity as a medullary space containing blood-vessels, nerves, and medullary elements, around which are arranged the layers of dentine, enamel, and cementum, we find a coincidence of the formation of bone on the one hand, and of secondary dentine on the other, in advancing age. In both instances the medullary elements are transformed into basis-substance; the nerves, probably, after having been reduced to medullary elements, also assisting in the formation of secondary dentine; and lastly, the blood-vessels are solidified. On an average the pulp-cavity is the smaller the older the person, until at last hardly any trace of the pulp-tissue is left, and the tooth represents an almost completely solid mass.

Opposed to carious destruction of the crown I have repeatedly met with formations of secondary dentine, as described by Salter and

Wedl. This occurred, however, only in those forms of caries which have been described by Frank Abbott as chronic (DENTAL COSMOS, 1879). I have specimens which illustrate that such secondary dentine formations, when the carious process has led to the exposure of the pulp and produced pulpitis, are again partially destroyed by the inflammatory process.

As to the irritation from without, first stated by Salter to be the cause of the formation of secondary dentine, I can add chronic pericementitis, which, when limited to one root or to a portion of the root, leads to the formation of secondary dentine in the pulp-canal of the affected root. This fact strongly supports my assertion that the tooth in its normal condition is living, and irritation of the external surface may result in a new production on the corresponding inner surface of the dentine. There are instances, however, in which neither age nor an external injury accounts for the formation of secondary dentine; and such an instance is that of the tooth above described. Here, perhaps, the absence of the fully-developed layer of cementum was the reason for such an extensive premature formation of secondary dentine.

The coarser anatomical relations of secondary dentine in general are accurately described by C. Wedl, with whom I fully agree. In analyzing the manifold formations of this kind, I would divide them as follows:

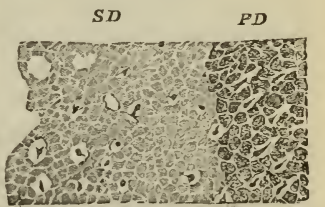
First. Secondary dentine resembling primary dentine.

Second. Secondary dentine with a laminated structure.

Third. Secondary dentine in form analogous to Haversian systems. This latter variety has been termed "osteo-dentine."

Secondary dentine, with the essential structure of primary dentine, is evidently the most frequent occurrence. It never has the regular arrangement of the dentinal canaliculi as seen in primary dentine, but is marked by a lighter color, owing to the larger amount of basis-substance and the relatively small number of canaliculi, which at the same time deviate more or less from the direction of the primary canaliculi. In cross-sections of such secondary dentine—especially in specimens stained with chloride of gold—we recognize in each canaliculus a central fiber (Fig. 5), from which delicate conical offshoots emanate towards the periphery of the canaliculus. The canaliculi, which as a rule are the wider the nearer to the pulp-cavity, are pierced on their periphery by light interrup-

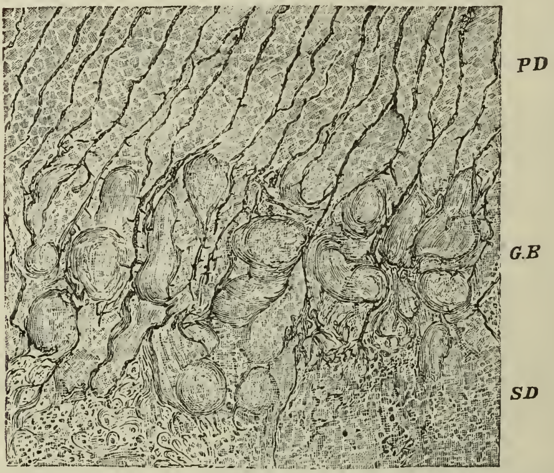
FIG. 5.



Cross-section of dentine of an aged person. PD, primary dentine; SD, secondary dentine. In the canaliculi of both dentinal fibers are visible. (Magnified × 1000.)

tions, leading into a delicate light reticulum throughout the whole basis-substance. In the reticulum the presence of living matter is not directly demonstrable, but it must be assumed mainly from the phenomena of inflammation, viz., caries and pulpitis. The secondary dentine sometimes remains in an embryonal condition, exhibiting roundish fields of basis-substance, such as are visible in the dentine of a nine months' fœtus. The medullary elements being transformed into basis-substance, represent irregular globular bodies, between which the living matter produces the formations known as Tomes's dentinal fibers. The origin of these fibers will be fully understood only after thorough investigation of the development of dentine. This much is certain, that the regular fibers of secondary dentine are also beaded, and send lateral offshoots towards the basis-substance, thus indicating the presence of living matter in the latter (Fig. 6).

Fig. 6.

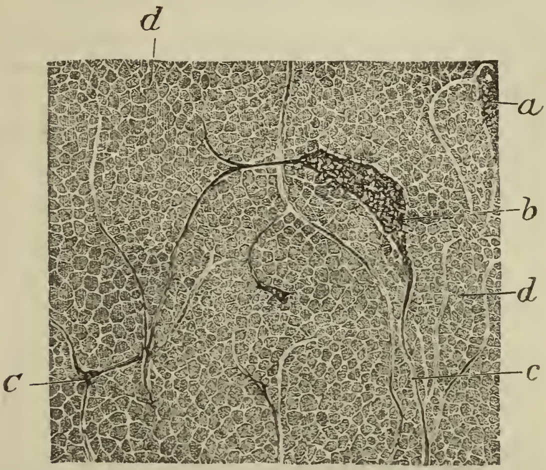


Secondary dentine with globular formations of the basis-substance. PD, primary dentine; SD, secondary dentine with irregularly scattered canaliculi; GB, globular bodies of secondary dentine, between which the dentinal canaliculi run, all in connection with those of the primary dentine. (Magnified × 500.)

Formations known as "interglobular spaces" are not infrequently met with in normal dentine. They are also quite common in secondary dentine, especially on the boundary between primary and secondary dentine. The tooth first described (Figs. 1 and 4) furnishes beautiful samples of such formations. Most of these are protoplasmic in nature; nay, some exhibit distinct nuclei. The offshoots are evidently fibers of living matter. Some of these, towards the primary dentine, are in direct communication with its fibers; others run in different directions towards neighboring kindred formations, with which they inosculate; others again, after repeated bifurcation, lose themselves in the basis-substance. Exceptionally there occur also protoplasmic bodies without any coarser offshoots. (Fig. 4, *b.*)

Higher amplification of these formations plainly demonstrates their minute structure. (Fig. 7.) We see protoplasmic bodies (*a b*) imbedded in lacunæ of the basis-substance, essentially identical with the so-called "interglobular spaces," the tenants of which never could have been made out in sections obtained from dry teeth. The protoplasmic bodies send larger beaded fibers in different directions into the basis-substance, which are partly in communication with fibers arising from neighboring bodies (*c c*). Some of the canaliculi I found empty, from which the fibers (evidently by the process of grinding) have been torn out. The protoplasmic bodies on their periphery send conical thorns through the light spaces between the protoplasm and the wall of the lacuna or interglobular space. The pointed ends of these thorns are directed towards the light reticulum, which pierces the basis-substance everywhere (*d d*). In this reticulum the living matter is not, as in regular dentine, directly demonstrable.

FIG. 7.



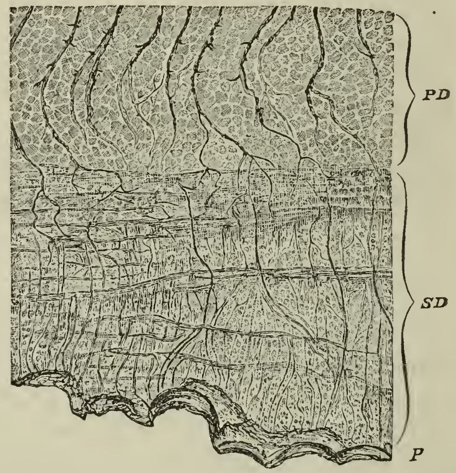
Secondary dentine from canine, middle portion of Fig. 1. *a b*, protoplasmic bodies with the reticular structure; *c c*, offshoots of protoplasmic bodies partly in direct connection with the latter; *d d*, basis-substance with the light net-like structure. (Magnified × 1000.)

The second variety of secondary dentine consists of the formation of a lamellated basis-substance, which is traversed by irregular dentinal canaliculi. I have observed from my specimens that the lamellated structure begins close to the termination of the primary dentine in an almost continuous course. The lamellæ themselves never are very regular, and produce broader and narrower layers, which as a rule are not strictly parallel to each other. In the interstices between the lamellæ, here and there, I have met with flat layers of protoplasm. The canaliculi piercing the lamellated dentine are generally very narrow, and run either in a rectangular or in an oblique direction to the lamellæ, with manifold ramifications. They invariably contain delicate beaded fibers of living matter, which send lateral conical offshoots towards the basis-substance, in a much more irregular distribution than we see in primary dentine.

On the boundary between primary and secondary dentine we very often succeed in tracing a direct continuity of the canaliculi of the former with those of the latter.

The figure (Fig. 8) which illustrates the lamellated variety of secondary dentine exhibits a peculiar feature of dentinal canaliculi in the primary dentine, near its connection with the lamellated formation, viz., bifurcations of the canaliculi of the primary dentine, which otherwise do not occur except on their terminations near the enamel and the cementum. The secondary dentine shows bay-like excavations in the pulp-cavity, evidently due to an inflammatory process of the pulp-tissue, which has led to the dissolution of the lime-salts. In the specimen from which I have taken the drawing the layer of the lamellated dentine is very broad towards the crown and apex of the root; while the middle portion of the pulp-cavity, though considerably narrowed, has a relatively small amount of secondary dentine on its limits. Such a small layer of secondary dentine from the middle portion of the pulp-cavity is represented in the figure.

Fig. 8.



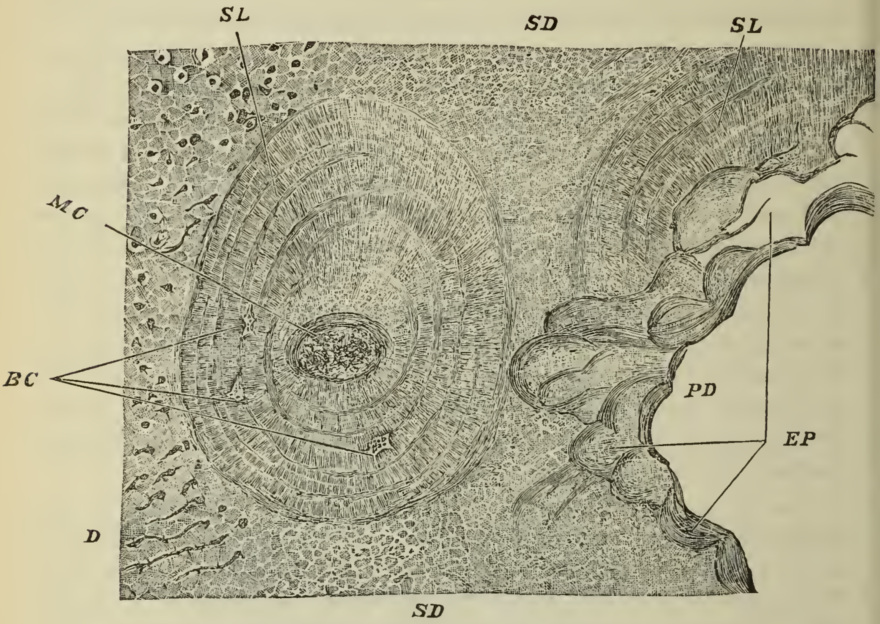
Lamellated variety of secondary dentine. PD, primary dentine; SD, secondary dentine; P, margin towards pulp-cavity, with bay-like excavations due to pulpitis. The lamellæ of the secondary dentine are irregular and pierced by dentinal fibers, which are partly in direct connection with those of the primary dentine. (Magnified × 500.)

In this group I would enumerate also those peculiar formations which have long been known by the term of "pulp-stones," and have been recently described by Adolph Witzel in his work "Die antiseptische Behandlung der Pulpakrankheiten des Zahnes" (Berlin, 1879), with whom I fully concur. These formations are very often without connection with the dentine proper. They have been considered as calcifications of the pulp, with which conception, so far as my own specimens are concerned, I cannot agree. In most of the specimens I have seen on the periphery, or at least on one portion of the hard pulp, faint concentric lamellæ; while the middle portion, or a certain part, exhibited a merely uniform granular structure. The lamellated part was invariably pierced by extremely delicate canaliculi, in a more or less regularly radiating direction. Sometimes small, spindle-shaped protoplasmic bodies are visible in connection with the dentinal canaliculi, such as we meet with in all varieties of secondary dentine. The process which has led to the formation of a so-called "pulp-stone" is by no means a mere deposition of lime-salts, but a transformation of the pulp-tissue, partly at least identical with lamellated dentine. Therefore we ought to call the process "eburnification," and the so-called pulp-stones "*eburnified pulps.*"

The third, and evidently rarest, form of secondary dentine is that known by the term "osteo-dentine." Formations of this kind are either pedunculated—viz., in connection with the primary dentine by a stem—or they partly fill the pulp-cavity in the shape of a uniform layer. There is a striking resemblance between osteo-dentine and Haversian systems of bone-tissue. The systems greatly vary in size and shape, and are separated from each other by a tissue kindred to primary dentine, but devoid of dentinal canaliculi. Each system has in its center a medullary canal, containing a certain amount of protoplasmic bodies known as medullary elements; nay, in some of the systems I have met with a central capillary blood-vessel, which has evidently been in direct union with capillaries of the pulp-tissue. Around the medullary canal a system of lamellæ is arranged, sometimes pretty regularly; and the lamellæ are traversed by delicate radiating canaliculi, closely resembling those of bone-tissue. Only exceptionally have I seen within the lamellæ protoplasmic formations analogous to bone-corpuscles. The jagged outlines of the lacunæ, in which the protoplasmic bodies lodge, are identical with those found in bone; and higher magnifying powers of the microscope, in fact, reveal an open communication of the lacunæ with the adjacent canaliculi.

In the specimen from which I have selected a spot for illustration (Fig. 9), the lamellated systems were developed in a most marked manner; and the blood-vessels in the center of these systems were so regular that they suggested the query whether or not we had here to deal with vaso-dentine, so common in the teeth of fish. These formations occurred in the apex of the root,—some of them in the midst of regular dentine,—while the lowest systems, without any distinct boundary, were connected with the cementum, which latter here and there also exhibited medullary canals.

Fig. 9.



Osteo-dentine, the third variety of secondary dentine. D, primary dentine; SD, secondary dentine; SL, system of lamellæ, resembling those of Haversian systems of bone; MC, medullary canal filled with protoplasm; BC, small protoplasmic bodies identical with bone-corpuscles; PD, boundary of secondary dentine towards the pulp-cavity; EP, erosions of osteo-dentine due to pulpitis. (Magnified × 600.)

In a large number of specimens of secondary dentine I was struck by the presence of bay-like excavations on the boundary of the pulp, filled with medullary elements or multinuclear protoplasmic bodies (myeloid bodies or myeloplaxes). The pulp-tissue exhibited all the features of inflammation, to which also the bay-like excavations in the secondary dentine were doubtless due. If we consider the formation of secondary dentine as the result of a slight but long-continued irritation, we readily understand that such an irritation may occasionally terminate in an inflammatory process,—so-called pulpitis. The newly-formed dentine, partly at least, will be destroyed by the inflammation, and thus produce a combination of both formative and destructive processes, so common in inflammation of bone-tissue. The presence of inflammation would also explain the pain which sometimes accompanies the formation of secondary dentine.

METHODS OF PRACTICE, BY AN EYE-WITNESS.

(Read before the New England Dental Convention, June 5, 1879.)

BY DR. C. G. DAVIS, NEW BEDFORD, MASS.

It is well known that there are two prominent and distinct methods of *saving teeth* (I beg pardon! of operating upon teeth) that are exactly antagonized. The one is the contouring method, at the head of which, in advocacy, is Dr. Atkinson; and the other, separating with disks, both as a curative and preventive measure, as introduced and practiced by Prof. Arthur, of Baltimore. Both of these parties use gold for filling material.

Then we have the "New Departure" advocates; at the head of whom, for practical results, is Prof. J. F. Flagg, who does not use gold. Now, I have visited all of these gentlemen, and many others, by all of whom I have been received with great cordiality, and have had the privilege of *seeing* operations as well as *talking of them.* The best representatives of these methods are strong men, and they have a remarkable *likeness*, in that each has an unhesitating way of positively asserting that he *saves* all the teeth he has charge of, while *each* believes that it is impossible to *save all the teeth* by any method but his own. In the New York Odontological Society, a lecture by Dr. Arthur, April 15, upon permanent separations with his new disks, was supported by two speakers, Drs. Benj. Lord and J. W. Clowes, both gentlemen of excellent reputation, while the other side of the question was opened, by request of the president, by another gentleman of world-wide reputation, who said that a text of Scripture came to his mind, viz.: "Answer a fool according to his folly."

Now, *here* ARE *antagonisms!* And yet they all argue that extractions are unnecessary. *We all know* what Dr. Atkinson's views are on this subject; and when I, standing over a patient of Dr. Arthur's, in his office, asked him if he could save all the teeth, even those of a very poor quality, by his method, he answered, "I should feel myself greatly culpable if I lost any teeth that I had the entire charge of."

I said to myself, and I say now, how strange is all this! I have faithfully used both these methods as I understand them, pursued them conscientiously for years, and met with failures, *i.e.*, failed to save all the teeth in all the mouths. I know your reply is—though you may be too polite to say it, your *thought* is—"Imperfect Manipulation." But, gentlemen, I am afraid that "won't wash." If my contour work is so imperfect, how is it that when my patients happen into the offices of the city dentists, anywhere from Boston to St. Louis, they invariably come back and say, "Your work in my mouth was very much admired by Dr. ——"?

I believe I have, in certain cases, exhausted the possibilities of contour work, but the teeth decay beyond the fillings in some inaccessible corner that necessitates the removal of work that has been done with long and tedious labor, exhausting to the nervous forces of both patient and operator, and that, too, in *soft teeth*, *within five years*. If the theory is correct, it must again be contoured, to still again decay in this mouth of vitiated secretions, whether the patient is scrupulously careful or not. I don't mean to have you understand that all the work I do is a failure. On the contrary, if I selected only the best mouths and the best teeth, I could say, with great self-gratulation, "Behold the work of fifteen or twenty years!" Such cases even *I* could produce, *but their immunity from decay* is *not* owing to my *operating* so much as to the *quality* of the teeth and the *favorable conditions.* I *take no credit* for *such "success!"* What we are looking to find, is the method that has within its possibilities the saving of the poor, miserable, chalky teeth, that are bathed in ropy mucus, and badly cared for by the wearer.

Do you not have such teeth to treat? If you do not you are lucky, and your contour of gold will do; but if you do, you cannot save them with contour or any other gold work except at an immense cost of wear and tear and money, and by an almost ceaseless patching. And even then, after two or three refillings with gold, you will be forced to use some plastic filling under the plea that "*Now they are not worth gold.*" At least, my friends, this has been my experience. When I talk about failures, I mean I fail to save *this class* of teeth for twenty, thirty, or forty years.

I wish to direct the attention of every dentist here to the excellent paper of Dr. Perry in the May number of the Dental Cosmos. It is full of thought and common sense, and gives evidence of very earnest and close observation. But no one can escape the impression that Dr. Perry has found it a very difficult thing to save teeth, and that he has been a constant witness to failures under all the different methods that he discusses, so far as proximate decay is concerned. It is true he recommends restoration after a certain nicely manipulated method, and adds, "It is so easy to be misunderstood that I must here say that even if the perfect restoration of very frail teeth be absolutely the best method, yet I am not willing to advocate its too general adoption.

"In the hands of a few accomplished operators, and *for those patients who are able to seek the best service, and are willing to expect final failures*, such operations in my judgment are the best that modern dentistry has to give."

Let us stop a moment and see what underlies this statement. If anything, the exclusion of all but the wealthy from the benefit of the *best skill*, (!) and *they* even must expect *final failures.* Does not that exclude the large majority of patients? Is it not a fair deduction from this expression of one of the most experienced and accomplished operators, that we need a method less elaborate and less expensive, and more within the reach of the less skillful and experienced? And is it not an acknowledgment that dentistry, as it has been practiced upon these teeth,—these very teeth that most need saving,—is a failure?

For a select practice such as all the first-class New York dentists have I have no doubt that Dr. Perry's method of treating proximate surfaces is the very best yet offered. The same thoughts have been forced upon my mind frequently in relation to these surfaces; but I have found it impracticable where one is compelled to accept everything that comes to eke out a mixed, country practice.

Then, again, how is the *young* practitioner to obtain the experience that will enable him to exercise the nice discrimination that Dr. Perry speaks of in the last part of his paper as having been acquired by years of observation of his own mistakes and successes? Do the schools teach young men in such a way that they can act with matured and discriminating judgment? What is judgment? Is it not a conclusion arrived at by balancing in the mind the sum of one's experiences? And how can one have a correct judgment who has had no experiences, or even if one has had no more than ten or a dozen years of experience? That is not time enough to determine the result of any special system of treatment of the teeth, unless, indeed, *it is so bad* as to be sufficiently manifest in that time. And I will go still further, and ask what is the judgment of a man worth who has had never so many years of experience, if he has blundered on with his eyes shut, without records of his results, or close and careful comparisons of his methods with the percentages of saved and lost in a given number of years?

In the paragraph just quoted Dr. Perry, knowing by the results of enlightened observation the danger, says that he would not advocate the general adoption of what he deems to be the *very best means of saving teeth*, because it only succeeds in the hands of the artist whose perceptions and manipulative touch are attuned to the right tension and harmony. He is talking of "*frail*" teeth here; but may I ask if any *tolerable dentist* has *difficulty in saving teeth that are not frail?* If then so careful an observer as Dr. Perry, who has tried them, finds that neither Dr. Atkinson's *contours* nor Dr. Arthur's *separations* save frail teeth, notwithstanding Drs. A. and A. "save all" the teeth they have the care of, what are we going to do?

I think that every one of twenty-five years' experience, who has observed, and whose overweening egotism has not blinded him to his own failures, will agree with me that Dr. Perry is right about the "frail teeth," at least. And yet, what are we good for if we cannot save the "frail teeth"? The others almost save themselves. *A little skill* will answer for them, just as the placebo cures the invalid who has vitality and strength enough to get well without it. I repeat, then, when such fine operators with gold as Dr. Perry find it difficult to save frail teeth,—as we must infer that *he does*,—how are the less skillful dentists to save them at all? I must confess I see but little light in this labyrinth of contradiction and dogmatic assertion, unless it comes from the "New Departure" doctrine,—so much abused, especially by those who know *least* about it.

As to the practical results of plastic work, I am not qualified to decide, because I have not practiced it in the *best manner*, nor for a sufficient length of time; but for the kind of teeth for which its use is advocated, it certainly cannot be worse than gold, as used by the average dentist.

It is fashionable to decry reformers, and so Dr. Flagg, in taking the stand he has, has received the usual pleasant compliments of *bungler*, *liar*, etc., from various distinguished sources; so, as *I was in doubt* about Dr..Flagg, as well as the plastic method, I called on that gentleman, and spent nearly a week with him in his office and at his house.

"Is it probable that Dr. Flagg had data which warranted him in making the statements found in his New York lecture?" is the query. I answer that, if any other man whom I have ever seen had made the statements, I should say, "No!" But Dr. Flagg is unlike most men in untiring, active energy. He is a bundle of high-tensioned nerve tissue. His normal condition is intense activity that never grows weary. There is evidently that condition of physical function which insures a healthful and rapid interchange of supply and waste, and the temperament keeps all the powers of mind and body intensified, as if run by superheated steam; and that, too, without apparent exhaustion.

With this ceaseless energy he has the habits of *method* and *concentration*. Hence he never spends an idle moment, but pursues *systematically* the subject in hand, not only in its direct line but in all its collateral bearings, until even its minute details are mastered,—as, for example, upon the subject of amalgams, he has at his tongue's end the composition and proportions of every alloy made, the degree of shrinkage, strength of edge, and degree of coloring in the mouth; the rapidity of setting, the proportion of mercury to the alloy to get the best results, etc. And it is in this fashion that he gets to the bottom of all the other plastics, and all other subjects bearing directly or indirectly upon operative dentistry. He allows nothing that is offered in this direction to the profession to elude his vigilance. His mind is always clear, and his perception penetrating and acute. He comes to a conclusion with a sharp incisive snap, but only after such deliberation as enables *his* mind to see all the *pros* and *cons*, which he is able to set before you with an avalanche of explanation like the sparks flying from a friction-belt! He talks always with an uninterrupted stream to an appreciative listener, to his patients, and to everybody near him, but always about *dentistry* or *subjects relating to it;* and yet he talks always to the point, and in an interesting and instructive way. This is a brief outline of the man as I saw him.

How could he have kept track of "1300"? is the question that is asked by every one.

Well, in the first place, he has a very simple method of recording all he does, and he never fails to do it. Nothing that he *wishes done* is any trouble to him to do,—not even operations on the mouth, which he makes a *pleasure.* And here is another key to the secret of his keeping the run of his patients, for they all come back to him, year after year, from Maine to California. (By *all*, I mean, of course, to speak approximately, and not positively.) He makes it a real pleasure to sit in his chair and have teeth "fixed up." He never hurts people, old or young. They all come with a glad smile to his chair,—*even the little children;* and he keeps them in the best of humor by his fund of anecdote and great sense of wit and humor. He sparkles and scintillates and runs over with fun in the most spontaneous manner possible. The dramatic stage has lost one of the greatest humoristic actors of the age by Dr. Flagg's taking to dentistry instead of to histrionic art. I stood by his chair the greater part of five days, and it was never empty more than a moment or two at a time. Little girls, little boys, middle-aged people of both sexes, and old ladies and gentlemen, passed in out and in rapid succession for dressings or operations, and all with a pleased delight. I was actually *disgusted* to see that none of them would even pretend to *be hurt!* Not even when one of White's engines, *run by electricity*, was burring about into dentine and decay of tooth after tooth. I went so far as to offer one patient five dollars to say that it hurt him; but he was incorruptible! Dr. Flagg sticks to the "1300," and in the light of the above I can conceive it possible. But let us suppose that his sanguine temperament has made it too many by half, and we then have 650 brought up to maturity with the loss of, *now*, I think, seven teeth. Three or four loose roots have been extracted since his New York torpedo was exploded. Admit *that* to be true, and still it is a marvelous result.

But when you stand by and see the quality of teeth that he treats, the marvel rises to a sublimity of astonishment! I scarcely saw a set of teeth in his chair that was not past *saving* or useless to treat, as the majority of dentists decide such cases. I expected to see now and then a set of teeth that looked like, at least, second quality, as we reckon them, but I saw none except of the third quality. The doctor tells me that he refuses all cases that could be saved with gold, and takes only such as gold-fillers are unable to save. There were half-teeth, loose teeth, loose roots with amalgam crowns, all comfortable, doing duty, and giving the patients immense satisfaction. I took pains to question them. I said, "How long have you been Dr. Flagg's patient?" The answer varied from *one* to *twenty* years. "How many teeth have you lost in that time?" "Oh! I have *never lost a tooth* since I came here," would be the *invariable response*, said with an air of astonishment and an intonation of apology *for me*, to think I should ask such a question. Now, when you come to take in all these facts, the astounding assertions of Dr. Flagg seem far more probable than they do judging from the stand-point and surroundings of the average gold-workers. The fact is, his patients come back to him and get patched and mended instead of being disgusted with long and tedious operations. His chalky teeth decay and break away from gutta-percha and amalgam; but they are easily repaired, and the wearers are glad to run in two or three times a year, if need be, and be made "comfortable." And if these teeth give trouble he treats them till they are quiet,—takes two or more loose roots, and "*rafts*" them together with piano wire and puts crowns of amalgam on them, and they go on doing duty.

One of his methods is to line the cavity with oxychloride of zinc, by placing in it a thin mixture and then "pelleting" out upon the walls with pellets of lint. He recommends gutta-percha at cervical walls, and the white lining of oxychloride at the labial and lingual walls, before the amalgam is used. He thinks decay is less rapid when so treated, and it saves discoloration, especially of front teeth, many of which he treats in this way, and they look fine. Sometimes he makes a crown of amalgam upon a front tooth or bicuspid, and when hard burs out a concavity with dove-tail slots upon the labial or buccal face, and fills this with *shaded* gutta-percha or oxyphosphate in a manner to conceal the amalgam and present quite the appearance of a tooth. He says the *best* alloys all contain copper, and mentions Lawrence's, Hardman's, Standard, and Gorges's as such.

The shrinkage of these amalgams, measured by the "measurer" of Dr. Bogue, is, Lawrence's, 2½ degrees; Gorges's, 2 degrees; Standard, 1 degree; Hardman's, ½ degree; provided the alloys are mixed with the right proportion of mercury, which is about 5 of mercury to 6 of alloy, by weight, as a rule. The directions are found with Standard alloy, which he uses chiefly, except where he is forced to work in a wet place, when he prefers Hardman's. "Edge strength" is an important quality in an amalgam, so it can be finished sharp without breaking. And in this respect the "Standard" is the best. Of the other plastics, "Caulk's" gutta-percha he considers best in every respect, except where a lower degree of heat is desirable than is necessary to render this soft. Of the oxychlorides, he thinks most of Justi's "Acme" and White's "Agate," but says Poulson's or Weston's oxyphosphate will last at least *three* times as long as any oxychloride, *if they are "good,"* but this is very difficult to obtain,—although they are *not insoluble*, as is claimed.

I need not speak of his "tap-holes" in treating pulpless roots, as he has written of them himself, and yet I did not understand them till I saw for myself. I do not hesitate to say that his method should be adopted by every dentist, as it will save fifty to seventy-five per cent. of alveolar abscesses. The method is simple: he fills the cavity of decay, and drills a hole at an accessible point, and treats the root through that with glycerin or a mixture of glycerin and oil of cloves; when the root is cured of soreness and odor, he fills with a taper-twisted cotton moistened with oil of cloves, and stops the tap-hole with gutta-percha; whenever peridental inflammation threatens, he removes the gutta-percha and cotton stopping, and saves a week's agony that usually attends alveolar abscess. If peridental *irritation exists*, he uses a little bag, muslin on one side and rubber cloth on the other, filled with red pepper and ginger; the muslin side lies next the gum, and permits the medicines to excite a flow of blood to that surface. I have, for years, used mustard leaves, cut in strips, for this purpose.

And now, in conclusion, I wish to say that *I have seen these things*, gentlemen, and while I hardly think I could do as he does, and be as successful with plastics, I know I could not be one-twentieth as successful with gold in treating the "miserable apologies" for teeth that he treats; and I would ask, do you not think that we had better be a little more economical with our disrespectful epithets, and with our wholesale condemnation of the "New Departure," until we have *studied* a little more its *principles*, and until we *know* a little more of the "True Inwardness" of its *manner* and *methods?*

THE DENTAL SPY-GLASS.

BY J. FOSTER FLAGG, D.D.S.

DIFFERENT people see different things differently; this is not strange, but it *is* strange how *very* differently different people see the *same* thing.

New views, new ideas, have been, since the remotest of historic records, always received with disapprobation, at least, and generally with abuse and *inflictions*, if possible, upon the promulgators.

It has seemed to make no difference to the opposition, no matter how good, how pure, how seemingly self-evident the truth of the innovations.

Even the work of Christ and of his apostles, even the doctrines of "love your enemies," "do good to them that despitefully use you," and "do unto others as you would have them do unto you," brought malediction, trial, and crucifixion upon their divine enunciator, and hardships, torture, and death upon his conscientious followers.

The well-known story of Columbus has, certainly, its pointed moral; as ridicule, cruelty, and treachery each tried its might to crush the man who dared to say the *earth was round!*

Galileo, for daring to assert the motion of the earth around the sun, was summoned to the Inquisition, thrown into prison, where, for many months, he languished; and at last, before a crowd of believers in "accepted" theories, upon his bended knees, and with his hands resting upon the Holy Scriptures, he pronounced *his* "recantation" of the great truths he had maintained, and rising, in his indignation at his own false swearing, hissing out "and yet it moves!" he was remanded back to prison, and for three years was forced each week to say the seven penitential psalms of David.

But times gradually change as centuries roll on.

Stephenson did not find it so very hard or dangerous to introduce the locomotive, although its services were "evidently going to do away entirely with the need for horses."

Morse found it easier yet to introduce the telegraph, even though *it* was going to obviate all further need for boys—to carry messages!

And still things change, as education spreads among the people, and Bell and Edison are *applauded* and *admired* for showing how much better 'tis to telephone than telegraph.

And still again, *more than all this*, the newsboys cry, "The latest views of Canon Farrar! latest views of Canon Farrar!" and when they're questioned as to "what's the news?" they answer glibly, "What's the news! Why, *there ain't no Hell!* Hooray!"

No wonder that they call *him* cannon Farrar! and even this is heard "respectfully," and with some show of credence.

Under these circumstances the "New Departure" seems to have been offered at an auspicious time.

It seems to have awakened a spirit of inquiry, if it has done nothing more.

It seems to have brought to the surface an amount of individual corroborative experience which is something remarkable.

It seems to have enlisted a degree of sympathy, which to no one can be more surprising than to those who have presented these radical modifications to those "principles" upon which has heretofore been based the practice of dentistry.

Letters of congratulation and encouragement have poured in upon us by the hundreds, and every mail brings fresh accessions to the growing list.

Grateful replies have been dispatched in all directions,—from Iowa to Massachusetts, from Canada to Georgia.

And what has done all this? *Merely a turning of the Dental Spy-Glass.*

Like almost every other thing, *this has two ends*,—a big end and a little end, a big hole and a little hole,—a big hole, easy to peep in at, with a lens arrangement so constructed as to permit the presence of but *one* object (gold) in the field; so adapted as to give to this object the admirable beauty of diminutive elegance.

It was seen, and pronounced "fine." It was wrought with, and pronounced "pre-eminently requiring skill." It was pumiced and burnished, and pronounced "artistic." It was admiringly gazed at, and pronounced "a jewel, worthy to adorn the priceless pearls within the ruby portals."

The patriarchs and textual law-givers held the Spy-Glass,—and it was "the thing" for the "respectable" members of the dental profession *to put their eyes to the big hole.*

As years passed on, and the profession grew in numbers and in dignity, colleges were established with larger and better arranged glasses,—glasses with tubes so long that it took *two years* to properly look through them! glasses with ends so large that classes of twenty, sixty, almost a hundred, sometimes would, all at once, put their united eyes to the big hole!

But somehow, it has so happened that ever and anon some brother, while waiting for a chance to take his periodic glance (that glance, which taken, and which noddingly approved of, maintained to him "respectability"), would, with a curiosity bordering on *imprudence*, (!) *furtively peep into the little end.*

How changed the view! how strange the "gem" appeared!—its imperfections magnified, its weaknesses betrayed, the "vulnerable spot" how sadly evident at the cervical edge!

.It could not be that this was true,—it was an optical illusion, all due to peeping in at the *disreputable little end.*

But more, how broad the view! how other objects—two, three, four, half a dozen—came into the field! and, as the badness of "immaculate goodness" then, for the first, was seen, the goodness even of "awful badness" became, in turn, apparent.

This was too much! and, in hot haste, a rush was made for the *big* *end*, that *peace of mind* might be restored, and that the doctrines of our fathers might, "*for our fathers' sakes*," be still adhered to.

But then this "rush" was seen! and other men (*how like the "weaker"* (?) *sex!*) wanted *a peep*, just to see *what it was* that made the first one run so! and they, in turn, looked in *and ran.* Oh, dreadful little end!

At last, some more than twenty years ago, a man of "great respectability" said he "*saw something*" from the little end, and though, from force of circumstance, a combined and complicated illness, and the representing of the "elders," he, Galileo-like, said that he thought he didn't; yet again, Galileo-like, *he did!*

And then he died, *but what he said he saw* gave heart to others, and the *peeps* went on!

Then came a sort of quiet time,—the time of soft and sticky foils, the time of one or many points, the time of hand or mallet, the time of building up or cutting down,—and this was a good old time! the same things could be talked over, the same ideas discussed, the same experiences related; and if some members were away from meeting even for a year or two, or seven, or *ten!* it made but little difference, the absentees could join right in as though they always had been "present," and the parade marched on! bearing the Spy-Glass (like a bowsprit) in the front, with its *little end* (like a bowsprit's) *far out ahead!*

Again the years passed by, until at length a "sincere," "earnest," and "well-meaning" man—a man to whom "no blame is charged," a man of an "investigative turn of mind"—climbed clear way out, quite to the *little end, and there he stayed*, this sincere, earnest, blameless man, with his eye *right at the little hole!*

And then he gently told his brethren what he saw; he told it softly, for he was lonely; he told it steadily, for he was sure; he told it reverently, for he was inspired.

It seemed as though that little mustard-seed of truth was slow to germinate, but germinate it did; and then two other men, just as sincere, almost as earnest, *but not near so blameless*, climbed way out there too; and then *three eyes* were soon "shamelessly" peeping through the *little hole.*

And there they peeped, and peeped, and peeped, and then they got some friends of theirs to join in peeping.

They were *not much*, these friends, *for they were not dentists;* they were only scientists and metallurgists, and such, but they were pretty good at peeping, and so they did it all the time for several years; and so it came to pass that all the time the more they peeped the more they saw; and so again, the more they saw the more they peeped.

At last they saw so much that they could scarce believe their eyes, and then they looked at one another, *and then they laughed*, for things were all so funny,—this funny little hole!

Gold, that had always been the "*best*," was shown to be, just in proportion to the NEED, the "WORST."

Fillings that were *shaped* precisely like the teeth (and more so), and *openings* that were large enough to pass a cart, were alike shown to be futile in their efforts to arrest decay.

'Twas shown that one might work his body thin *and have his proudest efforts fail ignobly.*

'Twas shown that *tin* and *gold,—largely tin* and *very little gold,*—instead of working ruin and destruction, causing abscess and the loss of teeth, would save with ease the very teeth which had been almost lost from using gold alone.

It showed that *leakage*, as mere leakage round a filling, was *not always bad;* that though the *leakage* of a filling made of *gold* was *fatal*, still, gutta-percha, which was *known to leak*, would save the tooth.

It showed that "vile" amalgam in a dreadful tooth would outlast gold in little holes, and laugh to scorn the proudest efforts of the "*most* respectable!"

It showed that "passing skill" in *working gold* was NOT THE STANDARD which should grade a man's position as a dentist, but that in the *nobler work* of SAVING TEETH they that can *save* the *most* and *save* the *worst* most satisfactorily, most permanently, and *with the greatest comfort to the patients*, will be the men who "BEST" will represent the almost boundless capabilities of "NEW DEPARTURE" DENTISTRY.

PROCEEDINGS OF DENTAL SOCIETIES.

NEW YORK ODONTOLOGICAL SOCIETY.

REGULAR meeting, held at the residence of Dr. Benjamin Lord, No. 34 West Twenty-eighth Street, on Tuesday evening, March 18, 1879.

The president, Dr. A. L. Northrop, in the chair.

The president advised the society of the death of one of its members, Dr. John H. McQuillen, of Philadelphia. The society voted that resolutions indicative of its sentiments in regard thereto be drawn up, and the president appointed Drs. C. E. Francis, Benjamin Lord, and W. A. Bronson a committee to draft such resolutions, with instructions to report during this meeting.

A paper on "Emotional Prodigality,"* by C. Fayette Taylor, M.D., of New York, was then read by the author.

Dr. N. W. Kingsley, New York. I was exceedingly interested in Dr. Taylor's paper, and can accord it the highest praise. The subject is out of the usual line of essays before this society, nevertheless it is one of great practical importance to us, individually and professionally. There was one point, however, with which I should disagree, unless I misunderstood the essayist. I believe he enumerated as one of the results of the stimulation of the nervous system and the emotional nature in childhood, a retarded dentition. Whether I understood him aright or not, this would be a natural supposition by a non-expert in dentition, even one who had observed the effects of the same causes upon the general physique.

It is an oft-observed physiological fact that the stimulation of the intellect, the nervous system, and the emotional nature in childhood diverts nutrition from the physical system, and its development is retarded; but, coincident with this, dentition holds an anomalous position. Instead of being retarded, dentition is accelerated.

The explanation of these phenomena was made in an essay which I had the honor to present before this society some four years ago, and with which most of you are familiar.

Since that time I have been observing more closely than ever, and the convictions then presented have received constant confirmation.

I do not remember a single exceptional case. I have now under my care a little girl ten years and three months old, small of stature but bright and intelligent even in advance of her years. The jaws are pinched, the teeth are irregular, and *all the teeth on the upper jaw are fully erupted and developed* (except the third molars, or so-called wisdom-teeth). Here we see molars and canines from two to three years in advance of their time.

This I believe to be a law to which there will be found but rare exceptions.

If you wish to find retarded dentition, seek for it among children of fair physical development but with sluggish intellects, and notably among the inmates of institutions for feeble-minded youth, or the asylums for idiots.

Dr. C. E. Francis, New York. The excellent paper read by Dr. Taylor brings to my mind a case in my own practice. Only yesterday a young school-girl some twelve years of age came to my office, as she has been in the habit of coming at intervals for the last two or three months, for the purpose of having her teeth regulated. Physically, she is a poorly-developed, white-faced, puny-looking child, with very irregular teeth. The child came after school-hours, and I noticed each time that she seemed very much fatigued. I said to her mother, "Your little girl studies too hard;" to which she replied, "Birdie is striving to get a prize,—she likes to study." A week or two later, the child came in with a ribbon around her neck, to which was attached a gold medal. At first I did not notice it, but the mother soon directed my attention to it by saying, "Don't you see that Birdie has a medal?" "Yes," said I, "but Birdie's general appearance, her pale face and irregular teeth, indicate that she is paying too dearly for the prize." It seemed to me that the child was physically injured by being over-petted, and that she was too much indulged and incited in her ambition to gain a prize at school. Cases like this are too common, and tend to substantiate the views advanced by Dr. Taylor.

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* This paper was published in the Dental Cosmos for July, 1879.

Dr. Geo. S. Allan, New York. Does Dr. Taylor make any comparative classification of the emotional elements in regard to their deleterious effects?

Dr. Taylor. I do not know that I can answer the question very satisfactorily. The classification of the emotions resolves itself, so far as I have observed, into different degrees of intensity rather than other and separable elements,—the most intense emotions being the most effective in modifying bodily functions. But I have noticed that ambition, conceit, love of praise, seem to excite the most intense feeling. When a child is reared in a family such as Dr. Francis has alluded to, the whole social atmosphere is of a nature to literally hound the child on to get the prize because the father or mother may be gratified; the child would not, except forced to, regard the lessons from the emotional stand-point. The worst cases are those of what I may call suppressed emotions,—emotions alternately excited and suppressed, or the manifestations of which are suppressed, thus giving an opportunity for double excitation. For it often becomes a habit like the use of opium, and the victim craves the habitual tipple of emotional excitement the same as the inebriate does his regular potion of alcohol or opium. This is strong language, and I am sorry that it is true in many instances. These persons must have every few days their periods of emotional inebriation,—hence transports of joy or agony, and tears about little nothings, and the extravagance of expression which is everywhere met with. Such persons deliberately put themselves in conditions to have their emotions thrilled, though they may be outwardly, in many cases, very calm,—and it often happens that those who manifest the most are really not so easily dominated by emotional influences as apparently calmer persons. But it is the fact that the emotional of some kind is made to be the preponderating, and thus a deleterious influence, which I would point out to you and deprecate.

Dr. Stellwagen, Philadelphia. If I remember rightly, it was only a few years ago, and in this room, at a meeting of this society, that I took the ground that the nervous system of the patient was a large factor in dental troubles. The essay of Dr. Taylor I consider to be one of the best, and the most properly timed, which has been given to the profession for a long time. Practical dentistry had for many years been delegated to excellent *jewelers;* but for the last thirty or forty years men of scientific status have been struggling to lift the profession from that slough. At times it has seemed almost impossible to impress the average dental mind with the idea that the teeth are not wood-blocks or inanimate objects. That mind has been so engaged with the very beautiful and exact *art* of dentistry as to have almost overlooked the *science* which compels recognition of that most important part of the human system,—the nervous. Therefore, while very far from subscribing to the creed of the "New Departure" (*as it has been laid before us*), I feel that it and other such ideas are working like a ferment for the benefit of the profession, inasmuch as they lead to investigation in fields of science hitherto too much neglected. The time is undoubtedly arrived, with many, when it would be better for them never to sit in a dentist's chair than to undergo such operations as they are often compelled to submit to. There are thousands of patients, more particularly among the gentler sex, who are more injured than benefited by the prolonged and tedious operations they are called upon to endure. Many of our best practitioners are beginning to see the truth of this; and the paper we have just heard must greatly aid such as the light of the new day is dawning upon.

Dr. Wm. H. Dwinelle, New York. I feel that we have matter of congratulation to ourselves in the fact that a man like Dr. Taylor, despite the heavy burdens his extensive practice and duties force upon him, comes to us to make such valuable contributions to our scientific knowledge as he has done to-night. It is not every member of other professions who knows our needs. At this time we are in great need of information in regard to the workings of the human nervous system and its reflex actions, the misappropriation of its forces and their inequality of distribution, and their connection with assimilation and nutrition. Dr. Taylor's practice, large as it is, is wholly the result of non-observance, on the part of his patients, of the laws and principles he has exemplified before us,—laws which, I believe, no man living is more capable of expounding to our benefit than he. We are, indeed, fortunate in sitting at his feet to-night. We have here a rare opportunity for making deductions, from which to frame practical applications of law in our own calling.

The committee appointed to draft resolutions on the death of Professor John H. McQuillen presented the following, which were adopted:

RESOLUTIONS ON THE DEATH OF PROFESSOR JOHN H. MCQUILLEN.

Whereas, It is with the deepest sorrow and regret that we learn of the death of our esteemed friend and professional brother, Professor John H. McQuillen, of Philadelphia, in the height of his usefulness and value to science, the dental profession, and humanity. Therefore,

Resolved, That we desire to record our high appreciation of his character as an unwearied and ardent student, a profound and original thinker, an earnest and successful teacher, and a professional man.

Resolved, That we hold up to professional attention his high scientific attainments, his never-ceasing exertions in the cause of professional advancement, and his ever-pronounced hostility towards tendencies degrading the calling he adorned, as examples worthy of study and imitation.

Resolved, That by his death this society, the dental profession, and the cause of science lose a faithful friend, an earnest and powerful helpmate, and an eloquent champion. And we extend our condolence to his colleagues in the Philadelphia Dental College for the great loss they are thus called upon to sustain.

Resolved, That a copy of these resolutions be engrossed and sent to his sorrowing family, to whom we offer our heartfelt sympathy in its deep affliction.

Resolved, That a page be set apart for these resolutions in the Transactions and Record-Book of this society.

CHAS. E. FRANCIS,
W. A. BRONSON, } *Committee.*
BENJ. LORD,

NEW YORK, March 18, 1879.

The following paper on "Anticipation of Caries by Separation," by Dr. W. G. A. Bonwill, of Philadelphia, was then read by the author:

To my mind there is no subject more important to the dental profession, and none which demands more thorough and careful investigation, than the one I propose to consider in this paper.

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The very able treatise of Dr. Robert Arthur, first published in 1871, was about the first in time, and certainly the first in importance, wherein was advocated so bold a measure as the prevention of decay by separation. His principles, as such, I hold to be nearly correct, yet I differ widely from him in the methods of their application.

The large majority of operators of the present day object to separations, on the ground that decay is certain to occur sooner or later. *They wait* for decay to progress far enough to insure them a filling. Yet, while crying out against the "destruction of tooth-substance" of the separatist, they have no objection to slash into or between proximate surfaces, in order simply and solely to insure their convenience in approaching the cavity, and in doing so they remove the points of contact of the contiguous teeth from the proximate cusps near the grinding surfaces (the most proper place for the teeth to touch), *and transfer that point of contact to the cervix, the place most favorable of all for the continuation of caries when once commenced.*

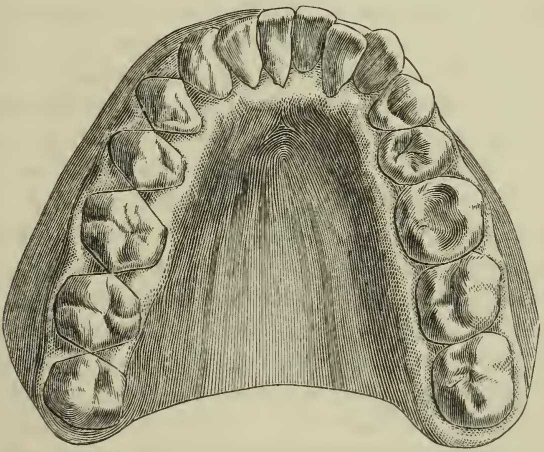
There may, perhaps, be found some slight excuse for not having prevented decay by separation in days gone by, in the fact that the instruments then applicable to the operation made it very unpleasant (and, indeed, often hazardous) to both patient and operator. But that excuse is no longer available, for our present appliances are such that we can, almost in the twinkling of an eye, and with the greatest ease and comfort to both patient and operator, perform such separations as will render innocuous even "the tooth of time."

To the dentist of even ordinary practice it must be evident that fillings, instead of arresting decay on proximate surfaces, very generally fail to do so; and that such cavities have to be refilled more than once, and that finally the tooth is lost. When decay is not checked in its incipiency, the contiguous surfaces become involved to such an extent that it is hardly safe to remove less than all that portion between the buccal and lingual or the labial and palatal surfaces, especially of the bicuspids and molars; and when not attacked early, the separation has universally been made so as to remove all natural abutment; thus allowing the teeth to crowd together at the cervix, the weakest part of the tooth, and the portion the most liable to attacks of caries (no matter how well filled) when the V-shape has been given to the cutting. Whenever a separation has been made on the Arthur plan (the lines pointing to and coming together at the cervix), it is next to impossible to prevent a recurrence of decay under that filling or after the operation. Not only is the food wedged tightly between the teeth, but *capillary action* is greater and more moisture is kept in continuous contact with those weakest of all the dental surfaces. The only sure remedy, where decay has been thus permitted to go unchecked, is *first-class* contour work (when the walls are sufficiently firm to bear the lateral strain of the gold); for thus the contact at the necks is removed, and the pressure is brought upon a substance imperishable from contact. But this practice is justifiable only in such cases as have never had the early and constant attention of a competent operator, or where poor operators have made or allowed such breaches as compel such treatment,—not for beauty, but for strength and future health.

If we have patients under our constant care, from the fourth year of age, and have had the privilege of doing for them whatever we judge expedient, should there ever exist any necessity for contour fillings in those mouths? Is there not some mode of practice which will, in such cases, forever exclude, not only contour, but any other fillings upon the proximate surfaces? Are we to continue the present system of jobbery simply because we have a legitimate business, calling, profession (call it as you will), and are entitled to make all we can from it?

Although we have, up to this time, done much in perfecting the packing of gold, in making the "perfect filling," in treating the diseases of the mouth, and in many minor matters, yet what a mountain of failures looms before us! What advance have we made in overcoming the *predisposition to caries?* What is the standard practice for the prevention of decay?

FIG. 1.



Right side, showing all the teeth from the cuspidatus in a crowded condition of the capillary tubes. Left side, after anticipation (similar to Figs. 7 and 8, from the buccal surfaces).

Every one of you will here, no doubt, exclaim, "I have saved many teeth by filing, the disk, or emery-cloth," or by such and such other plans involving separation. So you have! I shall not dispute you there. But, my friends, *why do you not do more of it?* If one or two cases in a mouth are justifiable, *why not more?* I do not hesitate to tell you that *I* allow very few proximate surfaces to escape my separating instruments, except those of the inferior incisors and cuspids.

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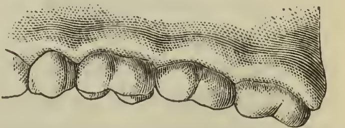
It will be seen that the proximate surfaces presenting the broadest and closest contact are the places to which food-substances are the surest to penetrate, and the longest to remain unmolested, and there is no more certain means of conveying and retaining finely divided substances, as flour, between proximate surfaces than *capillary action.*

FIG. 2.



Showing condition from the buccal side of the same teeth as shown in Fig. 1, right side.

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From what I have said you will understand that I consider chemical action as the active agent in dental caries; that animalcula or fungi take no part in that action until after it is set up, and then only as assisting the production of acidity in the food deposited, and as scavengers; that inflammatory action cannot be a factor in the process while the acid is acting on the enamel; that when dentine is attacked, inflammation is active only in a restorative, not in a destructive direction; that the physical relations of the teeth are such, on their proximate sides, as to form *capillary fissures*,—these occurring also wherever there is a fissure from contact, without true union; *that the point of contact is the last point to succumb to decay, and never the first to be attacked;* that the principal active agent in the destructive chemical actions in the mouth is starch or its products, when these are extracted from their original combinations in the animal or vegetable and reduced to powder; that the saliva is merely the diluent of the finest particles of food, and the medium by which they are carried to the capillary dental fissures, and is not an active agent to produce caries as an acid, though it *may be* such an agent through the mucus and organic matter it contains; that the temperature of the mouth—98° F.—and the oral moisture are the always present necessary conditions to the acetous fermentation which occurs in the food and mucus conveyed to, and retained in, the capillary dental fissures. From these result the following aphorisms:

Dental caries can best be treated by prevention or anticipation.

Prevention can best be secured by destroying the opportunities for capillary action found in the natural arrangement of the teeth, as fast as the permanent teeth make their appearance, or after they have all erupted, by giving the proper shaping to their proximate surfaces.

The majority of the teeth of the present day are so arranged and constituted that *immediate action* in prevention is necessary in each case.

It will be useless to depend, for aid in the prevention of caries, upon any reforms in the general diet and in the hygienic precautions universally in use.

It is absolutely necessary to apply all our improved mechanical appliances, at once, to the separation of the teeth and the abolition of dental capillary systems, in order to save teeth from caries and from fillings.

How shall we best effect separations?

Before entering upon an exposition of my own conclusions and practice in this regard, I would like to say a word in regard to those of Dr. Robert Arthur. It was contended by him, in the edition of his work dated 1871, that the V-shaped opening (allowing the cervical margins to come together, form the point of the V, and take all lateral pressure) was the best form of division. In making this V, the sides were to come together at the cervix in a fine point, and the contact there was to be less in width than at the grinding surfaces. From this doctrine I differ *in toto*, now, as in the past. Neither Dr. Arthur nor any of his disciples can prove such a course correct, as applied to bicuspids and molars. Individual cases of success under such treatment can doubtless be cited; but they will be found only in hard, flinty teeth.

Indeed, upon perusing the second edition of his work, just issued, I am not surprised to find that he has been led, from the "arguments of others," to abandon this V shape with bicuspids and molars, and in its stead to adopt the principle which I advocated and published shortly after the appearance of his first edition, in 1871. He designates capillary action as the passive cause of decay, and believes that decay never begins *at the point of contact.* He found that at the cervical point of his V division capillary action kept the pulpy food in constant contact, and decay went on unless great care of the teeth was exercised. But his present shape of division is still faulty, inasmuch as it meets only a very few of the cases and indications. He now separates so as to make the walls of the opening parallel, leaving a nearly square shoulder at the neck.

And now to my own practice. My attention was first drawn to the matter by my father, who, while studying at the University of Pennsylvania, from 1823 to 1827, had himself filed widely apart all his own superior incisors; being convinced that this plan, then being agitated in Philadelphia, was correct. To the day of his death, forty years after, those teeth remained in a state of perfect preservation, while decay had done its work upon the others left unfiled. Thus, long before I had any thought of studying dentistry, my mind was prepared for the reception of advanced ideas upon the subject.

When, in 1853, I entered a dental office, I made myself, with an ordinary safe-sided dividing file, a clear division between my superior incisors on the right side, the left lateral being too far decayed for relief except by filling. Between the right lateral and cuspid I could not entirely remove the decay; but I left a nearly square shoulder at the cervical border, and to this day those spots of decay remain without change, although not level with the surrounding tooth-structure. The incisors had the file carried from the cutting edge up to the cervix, where a shoulder was left; the sides of the cut being parallel. I wedged the cuspid from the bicuspid until a pointed, round-faced file could be made to take off the decay between the natural point of contact at the bucco-grinding surface and the cervix; leaving no part of the tooth touching except a very trifling point at the bucco-grinding surface around which no accumulation could take place. The left lateral, which had been filled (pulp exposed and treated), was soon laid to rest with an artificial substitute. The anticipated cases are all sound to this day.

You must see from this early commencement, dating back before I had any conception of dentistry, that my mind was early trained to certain general principles of physics by my father; who had the heroism to do what his constructive mind conceived was correct, on general laws. When I performed the same operation upon myself at the age of twenty, it was with a perfect willingness resulting from its practice in my father's mouth forty years before; and, fully convinced of its correctness, I applied it wherever an opportunity offered.

Did I carry out this scheme on an extensive scale when I first entered practice? No. I was discreet enough to take advantage only of such cases as occurred on proximate surfaces where I had filled an adjoining cavity. Occasionally cases came under my charge where I had the pleasure of viewing teeth that had been widely separated with a rough file for the removal of superficial decay; which, in every case, where the surfaces were standing alone from the shoulder at the cervix, were perfectly preserved; and where decay had not been entirely removed it had gone no farther. I frequently resorted in my early practice to the extraction of the sixth-year molars when much decayed, or when very crowded, if there was much predisposition to decay in the other teeth; provided I could do so just as the second molar was about to make its appearance, or where the gum gave evidence of its eruption. Where decay had not made any impress on the bicuspids I felt sure of great benefit from such practice. I could not trust alone to this to give me a separation of all the other teeth. To relieve crowded teeth is not enough. The *simple contact* of teeth will prove fatal and an incentive to active decay.

The use of the chisel of various shapes gave me additional advantage, and I became bolder. But what gave me the most encouragement in pushing it to a system was the dental engine. In 1869, just after I had made my first effort at filling with my electro-magnetic mallet, I found my fillings so much harder to dress up than when placed in by hand-pressure, that I resorted of necessity to a foot engine to run by a belt, to carry burs and stones to shape my fillings as well as for giving form to cavities. At this time I had never seen a dental engine, and the pressure of necessity alone drove me to construct it. I soon saw that with the aid of corundum of various shapes I could separate the bicuspids and molars in many cases to great advantage, and inasmuch as the operation was painless, and the labor involved almost nothing compared to chiseling, a wide field was now opened to carry out my plan which had been so long incubating; and I saw my method could assume shape, and that I could make it a principle of practice which could be reasonably and extensively adopted, since the means could be in the hands of nearly every practitioner. To have attempted it before in other than individual cases was impracticable and really impossible; but the engine, with the diamond reamer, corundum wheels, extremely hardened pyramidal steel points, and polishing powders so easily and perfectly applied through the rapid revolutions, made the practice possible of systematization.

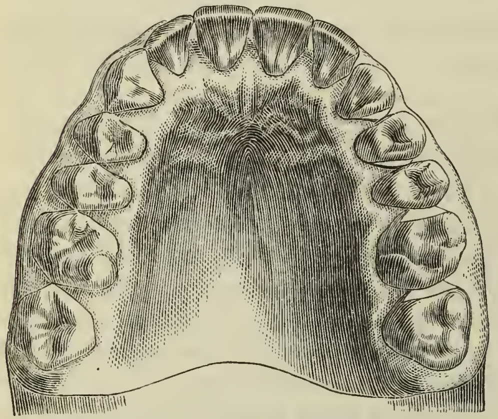
And what further led to its adoption in so wholesale a manner was the number of cases falling into my hands from other operators who had tried in vain self-cleansing surfaces, and by making persistent efforts in the use of gold foil in every case as if there was nothing beyond. But from the decay having *progressed too far before taking action to fill* and then depending upon cervical walls to keep the teeth from approaching each other, failure upon failure came, and *contour* had to *fill* the bill.

My conscience rebelled against such dentistry, and I pressed on to apply the "*ounce of anticipation*" rather than wait to see all the proximate surfaces so involved as to make one's heart almost bleed,—although it was a mint to me, since I had at my command the electro-magnetic mallet by which I could save one-half to three-fourths my time in gold filling and nearly all my labor; and great were the inducements to practice what was pecuniarily the most remunerative to me, and the hope that I might make much by the general use of such an adjunct if I would not practice anticipation. One of my good friends here, who is so much in favor of contour that he is as blind to everything else as I am considered to be on anticipation, said to me, he was surprised at me more than at any other man for adopting such a practice when I had at my command such an invaluable help as the electric mallet, by which I could so easily contour every operation, and let the teeth go on to decay without looking for measures to prevent it.

But, gentlemen, I looked beyond myself or my humble productions, for I knew what that friend could not then see,—that anticipation was correct and could be so practiced. From this I hope you will believe that avarice has not shaped my action, but rather the reverse.

To be successful, I compel my patients who have children to send them to me at the third year. As soon as the least decay takes place upon the grinding surfaces I fill at once with tin or amalgam (seldom gutta-percha). If the parents and relatives have had poor teeth which have commenced early to decay, and have required much watching, and there are evidences of incipient caries in the child's teeth, with darkened proximate surfaces, as soon as the child will permit I separate the cuspids from the laterals and also the first and second molars by a simple division with the disk of square edge, running it down in parallel lines to near the cervix, not destroying the contact at that point, but leaving the bottom square as possible, and allowing no V shape to suck up the food at the cervix. I take more of the tooth-substance from the mesial surface of the molars and almost entirely from that side, so that there is no possibility of the food wedging in between parallel walls and down upon the cervix; and at the same time let the space be a little greater on the lingual side and the palatal also, permitting the food which is not wedged on account of parallel walls from the grinding surface to the cervix to free itself easily. This opening is demanded in this shape, as the temporary teeth are in close proximity quite down to the gum, which is not often the case with the permanent. Before the first permanent molar erupts, the distal surface of the second temporary molar is shaped thus (see Fig. 3, distal surface of second permanent molar, right side, prepared for the coming third molar), as in the permanent teeth, as I will show further on, taking nearly as much from the buccal as the palatal or lingual side, leaving a knife-edged projection on the most prominent part on that surface, so that when the first permanent molar rises to its place no food can accumulate around that line, since capillary action is thus prevented. If the incisors show signs of decay, with the disk, I separate freely from the incising surfaces, leaving them free with nearly square bottom near the cervix, and enough shoulder to prevent contact above or below.

Fig. 3.



Full upper, showing anticipatory treatment by leaving the point of contact at cervix, as on the left side; and at the grinding surface, as on the right side; and at the cutting edges of the incisors.

This constitutes anticipation in children's temporary sets, which, if done before decay has made any inroads, will surely save them without decay. But here, as in the permanent set, anticipation cannot be relied upon when decay has got a start, except in a few instances by *very bold and wide divisions.* We cannot hope for so much from children, as they will not submit always to the use of the means we have to employ, but I persevere in doing it where I can. By all means remove the distal surfaces of the second temporary molars, so that the mesial face of the first permanent molars may remain perfect, as referred to above in Fig. 3. This same point Dr. Arthur urged, and wisely; but, unfortunately, on the double V-shaped plan.

No more can now be done with the first permanent molar until just before the second molar emerges, unless the gum has acted as a flap to hold food in contact with its distal surface to cause its decay or endanger it. This will seldom be necessary until the twelfth to the fourteenth year.

The coming down together of the permanent centrals prevents action upon their mesial surfaces until they are grown full length. But their distal surfaces may be shaped on the palatal side as soon as the temporary lateral is lost and before the permanent has appeared; and we will not remove the distal surface of the permanent lateral when it has come, but take from the mesial surface of the temporary cuspid, and wait for action on the palato-distal surface of the permanent lateral before the permanent cuspid has grown down.

This course has been well described in Dr. Arthur's treatise, and to it no one can take exception. It cannot always be certainly carried out, as parents forget to send their children at the proper time, and we have then to wait until all the permanent incisors and most of the back teeth are in place, which, ordinarily, is not too late. And besides, as many cases of irregularity are now occurring either from congenital causes or where the temporary teeth have been removed too soon or too late, it is well to wait until the full complement is in place, except in the case of the second molar.

So easily can the permanent incisors be modeled after they are once in place that decay *will never occur* on their proximate walls. I should hold myself responsible to fill any cavity decaying after I had operated for anticipation, as I now practice it, and I feel that the dental world is chargeable with a great sin of omission in not having accepted the doctrine earlier and more generally. So sure am I that I guarantee ninety-five per cent. of the cases, and in the execution I charge two-thirds less than for the smallest filling.

I have lately witnessed some of the early separations, with the file, of Elisha Townsend, made over thirty years ago, in perfect preservation, while his first-class gold fillings had allowed decay to occur about them and the teeth had to be refilled. In some decay was left at the time of separation, and no further change had occurred. Frequently I see some of my early cases of twenty years back, and have yearly visitations from them since I commenced using my present appliances, and I have no regrets, but am thankful I had the boldness to do the work at the right moment.

The superior incisors, then, are comparatively easy to save. The inferior I but seldom find decayed, even in later life. Hence I practice anticipation upon them only in occasional cases. One in particular I did in 1854 while in Baltimore, which, I see every year, remains as then, while the superior teeth were all gone before I saw the patient.

You may ask, what means can be used to make the separation of these teeth so easy? When I first commenced this wholesale practice I resorted to a pyramidal-pointed black diamond, made as small in diameter, with but three angles, as could well be done without endangering fracture of the stone at its point. This I used in a heavy right-angle attachment made of steel, which would bear hard usage. It was applied entirely from the palatal side, and carried up and down with a rapid movement of the hand, while I endeavored to run the engine at five thousand revolutions per minute. When first placed on the teeth or between them, on account of nothing but a small point touching, there would be but little abrasion; but as soon as the angles began to come in contact with the enamel it did its duty rapidly and smoothly. In the mean time water was applied in abundance to prevent heating. I can thus separate the worst case in five minutes.

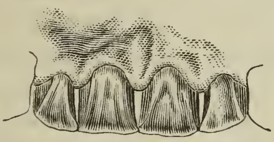
But within the past year I have abandoned this tool in the majority of cases in incisors, and now resort to a much smaller one, made of steel very hard and tough. It is also pyramidal, as the diamond, and about one-quarter inch to three eighths in length, and not occupying more than $\frac{3}{32}$ inch in diameter, and with three sides. This tool revolving at great speed cuts very rapidly, even without water. It can be sharpened with comparative ease on an Arkansas stone, and will require resharpening about once or twice while separating between any of the incisors. By having a number of these cutters, no time is lost in substituting a sharp one. They are made of various sizes. So smoothly do they cut that but little polishing is needed.

One very great advantage I find in the steel tool. I seldom use my right-angle, as the ordinary hand-piece allows it to go on the palatal side and cut through with its sides from the very first, and not with the point; but the point is permitted to go as far through on the labial side as is desirable. The only unpleasantness connected with it is the jar of the three sides upon the walls of the teeth. When cutting on dentine the velocity and blow annihilate pain.

I must say here that to be successful with instruments of so small a diameter, from three to five thousand revolutions per minute must be attained. If less, you will not cut the surface, but will jam the instrument between the teeth and fracture it. *This must not be lost sight of.* And if I had no other reason for denying the assertions of those who claim to have thus practiced anticipation on the incisors, I could from this fact confidently do so, since there is no engine in the market which will give that speed by which it can be done to satisfaction, without great outlay of foot-power or very rapid treading, with risk of breaking cables or springs.

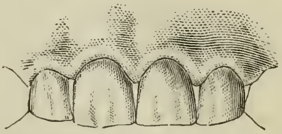
The shape of separation in the incisors should generally be elliptical, with the cutting edges touching at a mere point, and not running the lines to so acute an angle as to favor and invite capillary action. (See Figs. 4 and 5.) Let the palatal side be wider than at any other part, and with ample space at the cervix.

FIG. 4.



Palatal surfaces of the superior incisors after anticipation with the small pyramidal steel reamer, the contact made alone at the cutting edges, except on the left side, where the incisor and cuspidatus are allowed to touch at the cervix, where a fine disk was used.

FIG. 5.



Same teeth as Figs. 3 and 4, showing anticipation from the labial surfaces by the steel reamer, used only from the palatal side.

There is a class of incisors in which the natural point of contact is not at the cutting edge. In such, do not remove that part, but permit the tool to cut in a line with the buccal face, and be sure that no part of the base is in contact near the cervix.

Where you cannot have a substantial point, leave a knife-edge on the buccal side as an abutment, running the full length of the incisors.

Another class of incisors is where the natural contact is at or near the cervix. In such I prefer to use a disk, cutting mostly from the palatal side up *near* the cervix, to destroy the sharp angles there and make square or obtusely rounded edges.

Frequently one tooth is in such a position that it will require the most cutting while the adjoining one requires merely polishing. To cite every peculiarity in cases would demand a separate chapter. One's judgment will soon become a sufficient guide, when he has a few hints and the *means to do the work.* Only a general law can be given in an essay.

When we pass to the bicuspids and molars we have to resort to another style of separation; still regarding the same law as to capillary action. Here, as in the incisors, no one exact shape can be laid down as the rule; yet it does not nullify the general law. More judgment is needed now than in the incisors, as we meet with greater variety of contour and positions and broader surfaces in contact. (See Figs. 1 and 2, right side.) In the majority of these I take nearly as much from the buccal surface as the palatal, making the angles more obtuse than when from the palatal alone, which causes no irritation to the gums.

You can always rely upon disintegrative action in the first permanent molar as soon as it has taken its place. At the latest moment, then, before its eruption, cut from the distal surface of the second temporary molar, leaving nothing but a knife-edge touching. But upon the loss of the latter tooth, and before the second bicuspid has erupted above the gum, cut from the mesial face of the first permanent molar and remove from both buccal and palatal or lingual surfaces, leaving the knife-edge or a very small point at that portion of it where *nature has designed it to touch;* which is found nearest the buccal wall. When the second bicuspid comes into place, you have not left a broad surface for capillary action, nor have you so interfered with the shape of the tooth as to allow it to rotate, nor can the surfaces hide pulpy food, nor is the enamel entirely removed. By such interference you have simply given to the natural form more acute angles, running from the same points of contact.

While operating upon this tooth you have the opportunity of fixing the first bicuspid by removing from its distal surface and giving it the same diamond shape, and this even more perfectly, from its smaller surface, making the angles more acute than with the molar. *Removing from the buccal surface cannot be detected, and does not mar in the least its beauty.* It is but seldom, then, that the second bicuspid will have to be touched. If the patient can be seen when the temporary cuspid is lost and the permanent cuspid is even with the gum, the first bicuspid can have its mesial face so treated that but a small portion of the buccal surface need be removed, but mostly from the palatal. Nevertheless, you can take an acute-angled piece from the buccal surface of the first bicuspid, and not mar its shape. I prefer generally to wait just here until the permanent cuspid has come forward fully in the arch, as this frequently makes a very material difference in the point of contact. I frequently remove the distal buccal surface of the cuspid and round it so that no one can recognize the change. Before the superior permanent cuspid comes down, the superior lateral's distal face can be modeled on its palatal side with a disk alone, when a favorable opportunity offers. But the dentist sees his patient generally when the arch has been completed. As I before said, I prefer to wait until this period for the incisors, as it requires less surface to be abraded to meet the requirements.

We now have all the teeth in position except the second molars. By all means remove the distal surface of the first permanent molar, superior and inferior, before the second molar is in contact. If it will be permitted by the patient at an earlier period, there will be no reason to regret it, as the second molar might get in place before being observed by him. It is not necessary to shape the distal surface of the second molar unless there is positive evidence of the coming of the third molar.

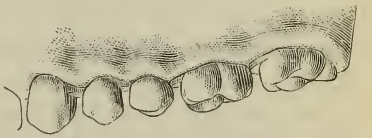
If I have not had the case before all the teeth are erupted, I, in the majority of cases, lose no time in applying this radical cure, for there is little hope of *anticipating* decay unless the surfaces are immediately modeled so that food will not remain upon them.

So difficult is it to detect caries in its early life so near the point of contact, and so wide-spread are the victims (almost every child we meet), that I can trust but few to go unchallenged.

To wedge apart every tooth for detecting decay is not only very painful and trying to patient and operator, but when opened there are no good results, as no ordinary small-pointed exploring needle can be made to catch in the decay, since at this stage of caries the tooth-structure is very solid. A small bur in the dental engine alone can prove whether there is softening. In my early experience I found many cases which it looked like sacrilege to touch; and, where decay would seem to be a stranger, I have found it far advanced. In such cases, later than the fifteenth to the twentieth year, there is no hope in separations, for then filling must be the resort.

To recur to the shaping of the bicuspids and molars. Where the molar teeth are short, thick, and the surfaces touching nearly or quite to the cervix, it will be found the best practice to remove the greater portion from the mesial face of the second molar rather than from both equally, and to carry the disk directly through from buccal to palatal or lingual walls and parallel down to near the cervix, leaving the shoulder alone on the mesial surface of the second molar, and the edges square or nearly so. (See Fig. 3, left side; also Fig. 6, buccal view.) The distal surface of the first molar is then cut on its buccal and palatal walls, making a wedge-shaped opening on either side of the teeth. When the most is taken from the second molar, the point of contact at the cervix is on one side, and no food can be wedged down; and when the gum has not been pressed down by food at this point, as would be the case when double V shapes are made, *no decay can occur* between that shoulder and the gum, as there is ever present the tough gum pressing upward towards the shoulder, which prevents capillary action next the gum. But this, remember, is where you meet the case after the teeth are all in place and decay mostly confined to the molars. Besides, it should be done

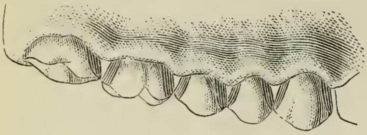
FIG. 6.



Same as Fig. 3, left buccal side, showing the point of contact at the cervix.

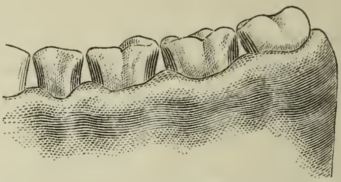
early, as decay commences in such cases very low or near the gum, the place favoring the absorption of the semi-fluids by capillary action.

Fig. 7.



Same as Fig. 3, right side, showing the point of contact at the grinding surface from the buccal side, where the disks of ¼ to ½ inch diameter, and the steel reamer, were used on both mesial and distal surfaces.

Fig. 8.



Same as Fig. 1, right side, showing the point of contact at the grinding surfaces from the buccal side, where the small disks were used on both mesial and distal surfaces, and finished between the cervix and grinding surfaces with the small pyramidal steel point.

In the bicuspids, when small, thick, and in close contact near to the gum, both the buccal and palatal or lingual walls can be cut up to the middle of the line of contact, from the distal surface mostly, with a half-inch disk; and if any surface is still touching at the cervix, the same steel pyramidal point used on the incisors comes in beautifully, removing the close contact near the cervix, and leaving nothing touching but the knife-edge or point at the natural abutment.

In some instances the buccal surface need not be touched, but it usually demands it, and when removed from the distal surfaces no one can ordinarily observe it. Occasionally the bicuspids here have to be cut directly through, carrying the walls down parallel to the cervix, the larger portion being taken from the distal surface of the first bicuspid, as in the case of the molars just cited, occasionally removing from the opposite proximate walls.

The shape of the tooth and its relative position to the ones adjoining, as well as whether decay or discoloration is present in the least on one more than the other, should determine which surface and which tooth should be cut through from the crown or partially from the buccal and lingual surfaces.

In the choice of disks I but seldom use larger than a half-inch. The inch is demanded only where contour fillings have to be resorted to, but never for anticipation. Half- to quarter-inch is better, and in doing full justice you should not scruple to cut the gum, and sometimes deeply. The smaller the disk the less the gum is cut. By doing so the surfaces at the cervical border are widely separated, and with the least labor and pain.

You naturally would suppose that the gums would suffer from the food rubbing against them, and that the teeth would turn out of position on their axes. But let me assure you that the gums are not in the least inflamed, but hug as closely to the cervix as if no change on the proximate walls had been made. Their integrity is not at all disturbed. If the same teeth had been allowed to decay, and contour fillings placed in them, the gums would have been mutilated to a great extent, and never have been so perfect again. For the sake of argument admit that the teeth go on to decay and a contour filling becomes necessary, does it so alter the shape of those teeth from the anticipation that it makes it more difficult to make contour? Not by any means, for you would remove under all circumstances every particle of the proximate walls to prevent tooth-substance from antagonizing.

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Discussion.

Dr. Dwinelle. I would like to ask Dr. Bonwill if we are to understand from the system that he has promulgated to-night that we are justified in separating by the file, diamond disk, or machinery of any kind, *sound teeth in anticipation of their decaying by contact?* That seems to be a natural deduction from the paper as we have heard it read.

Dr. Bonwill. I had hoped I would not be called upon to say anything more upon this subject. To be brief, however, I will say in reply to the query that, judging from the failures to preserve the human teeth that I meet with every hour, and the immense amount of destruction even after the best operators have reared their most beautiful monuments, and the general and increasing weakness of human nature, without any bright rays of hope from society as at present constituted,—I say, the teeth of the present generation, such as I have found in my original practice, and much of it from the hands of other practitioners,—I believe it to be my duty, after long years of experience in this line of practice,—anticipation of caries,—to demand of my patrons their children from their fourth year, and not to wait for the temporary teeth to remain long in contact, but separate the molars and the cuspids from the first molars, and shape the distal surface of the second molar to meet the first permanent molar, and every three or six months inspect them, until their sixteenth year, any way, instead of *waiting*, when I *know* that nearly every proximate surface will be involved by that date. If I am wrong in my judgment, then I am incapable, and it would then seem useless for any one to attempt to found a practice upon long experience. *Decay can only be anticipated* by preparing the surfaces of teeth *before any caries has been discovered.* To wait is death; filling will be the sequel.

Dr. Dwinelle. Then, Mr. President, I have to say, and I believe the majority of those who are present here will bear me out in saying it (especially the elder members of the profession), that the subject of the paper—the practice as evolved in the paper—is but the practice that has been in vogue since dentistry began. It is true we have facilities at the present day by which we can perform these operations in a more convenient and practical way than before; but, essentially, the practice is not new. It is the old beaten track that every intelligent dentist has gone over again and again during the whole period of his practice, if he has done his duty. I make that qualification because I deprecate anticipation in its broad sense, as expressed here to-night. I do not believe that we are justified in filing a sound tooth in anticipation of its possible decay. I do not believe in separating sound teeth, and grinding off the enamel, that God, in his wisdom, put upon their surface, rudely exposing the dentine, for the purpose of *saving* (?) them. I do not believe we have a right to do it, except under extraordinary circumstances, where decay has already begun, and where it is perceptible.

The file has been used freely, too freely; so much so, that it has been regarded, in a certain sense, as one of the relics of the Dark Ages. The file formerly (forty or fifty years ago) frequently did a great deal of good, but more often a great deal of harm. The filing, according to the old system, was done by cutting down parallel walls between the teeth, leaving a small portion of the teeth to approximate at the cervical edge, and filing in such a manner that the largest diameter of the cut would be on the lingual rather than on the buccal walls. That is the old system, which was ever qualified by the skill by which it was done. I said that I approved of this to a certain extent. By this I mean that I approve of it when it is necessary, but disapprove of it when it is unnecessary. It is essentially the practice which has been demonstrated here to-night; but, at the same time, I do not approve of filing natural and sound teeth for the purpose of anticipating decay that might come to them. It is perfectly right and proper, and we are not only justified but it is our duty in making an examination of teeth, when we have reason to believe that decay has taken place, even superficially, to separate and polish them by any measure that will accomplish it best. The system which has been indicated here to-night has been indicated and taught, and practiced substantially, ever since the history of dentistry began.

I rise more especially to enter a solemn protest against the practice advocated here to-night, of anticipation, of filing or cutting sound teeth apart to prevent their possible decay. I protest, in the name of Almighty God and his wisdom, against this monstrous doctrine, this vandalism, of mutilating the human teeth, breaking up the beautiful lines of their contour, disfiguring them, depriving them of their protecting enamel, and exposing the dentine of their interior to the elements from which it is the continual effort of our art to shield them, and substituting an inferior porous surface for the semi-vitrified one of the enamel.

If the doctrine of anticipation were true, all sound teeth in contact at sixty ought to have been filed apart at twelve years of age, to have insured them against decay.

In the name of all that is honest and dignified in our profession, I enter a protest against the system of cutting away the proximate walls of sound natural teeth in anticipation of their possible decay in the future. It is wrong.

Dr. J. W. Clowes, New York. I regret that Dr. Bonwill has not had a blackboard with which to illustrate the manner and form of his separations. If I have understood him correctly, the separating he advocates is not, in all respects, what it should be. Having long been known by my professional brethren, in this city, as the great separatist, I almost feel as though the doctor has been appropriating some of my personal thunder. Nevertheless, he is welcome, providing he gives it the true *roll.* This matter of separation is a vital one, and second to none in importance. Separations will save or destroy teeth, and results determine their quality. I trust no one will follow either.Dr. Bonwill or myself without first understanding how we *shape* the separations. An *ignorant following* will be sure to result in disaster.

I have previously stated to this society that "*without separation there can be no permanent salvation for human teeth.*" I cannot make any stronger or broader declaration than this. *I believe* in *anticipating* decay. For if teeth are together,—"contact being always dangerous,"—they will sooner or later decay. I have repeatedly said that kind Nature has shown us the wisdom of separation, in the fact that where teeth are naturally apart they remain sound, but where contact exists they decay. This being the case, why should we leave them together? The idea of not separating the teeth because the Almighty made the enamel and the bone is about as preposterous as the refusal to trim a grape-vine because of the *location* of its branches. We know what comes of judiciously pruning a vine. So, if we separate teeth properly, we shall get a good crop of soundness. Of all the preventive means that dentistry employs, there is nothing like separation. *Enamel has nothing to do with the preservation of teeth from decay.* Some entertain the old-fogy notion that it has. But the truth is that it is the very first thing to succumb to the enemy. Cut it away fearlessly, gentlemen, but be sure to do it *properly.* Why, when a person comes to me with a full denture, each and every tooth in contact with some other, "why," I ask, knowing what I know, "should I allow the waste and destruction which are sure to follow the inimical condition?" In the times of past ignorance the failure to prevent disease might have been entitled to a "wink;" but now, in the broad light of test and experience, the sin of *omission* should be without palliation and without excuse. To illustrate: A young lady came to me a year ago, whose teeth were finely developed. I had taken great pains, from her early childhood, to have them regular and nice. I had given her the most approved directions for their care. Admonition and warning had not been wanting. But I fear she had not been equal to the *requirements*. A twelvemonth later, that splendid set of teeth was decayed in a shocking manner. Doubtless some special cause of decay had been present,—what I know not,—but had I separated those teeth a year sooner, they would still have been sound, because the damaging force, without *retention*, would have fallen away and been harmless. Do not hesitate to anticipate decay, and separate sound teeth with a steady hand and clear conscience. Be fearless, and let the disk, the chisel, and the file do their saving work.

Dr. Bonwill. I know very well that the gentlemen present cannot speak upon *this mode* I have given to-night from hearing it stated but once. It can only be done when seen in print and studied carefully with the drawings from accurate models, which I have chosen not to have present, preferring to have you look at it closely. You cannot, in justice to yourselves, attack me upon a point of this kind, when *I know* you have not adopted it, nor have you had any experience in it. The *file* could never do; it will not touch the case. There is nothing but the dental engine, with its three to five thousand revolutions with the hard rubber corundum disks, and the diamond and steel reamers specially adapted for the work. Hence I assumed that my method has never been practiced; the means have not been at hand.

As to the novelty of the preservation of decay by filing and chiseling, I cannot say where it originated. Dr. Arthur was the first to boldly announce it on a given style, which he has since abandoned. This I never adopted, but fought it from the first, so far as the molars and bicuspids were concerned. I ask the gentlemen not to abuse my system, nor abuse me for advocating such a thing, until they thoroughly study my article; then they can talk, write, and practice intelligently in regard to it.

Adjourned.

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The stated meeting of this society was held at the office of Dr. E. T. Darby, on Saturday, April 5, 1879. The value, adaptation, and durability of the various oxychlorides as filling materials was discussed, Dr. Dixon expressing himself as much interested in experiments with them. He stated his belief that operative dentistry is on the eve of a great change in the direction of the employment of earthy plastic materials; while he employed them with advantage, he finds they often prove of variable durability. Other members expressed somewhat similar views.

Dr. S. H. Guilford read the following paper:

Contour Fillings or Flush, Which and When?

The change in the methods of operative dentistry within the past twenty years has been most marked and radical.

More especially is this true in regard to that most practical portion of it, the filling of teeth. Many causes have combined to bring about this result, but none have exerted a more potent influence than the introduction of cohesive foil, and the invention of the rubber dam and the various mallets. Before their discovery all foil was non-cohesive in its character, or nearly so, and fillings introduced with it were usually only flush with the edges of the cavity. Now, fillings are introduced that not only fill the cavity but extend beyond it, and restore in shape all that portion of the tooth that has been lost. The former method, practiced through many long years, and thus having been tried by experience and found efficient, has had, and still has, many advocates and followers; the latter, while it has not had the trial of so many years to test it, seems to have been tried long enough to have proven its efficacy and usefulness; and its advocates claim for it not only all the value of the old method, but, in addition, many points of superiority.

These two methods, while they are alike in their main object, the arrest of decay and salvation of the tooth, are diametrically opposite in all other respects. Each one has its supporters, and in the conflict so long waged and still waging between them, it would seem as though each one of us must choose his side. Which one shall we adopt? Or can we occupy a middle ground and use each and either according to the circumstances of each particular case? In order to determine this matter intelligently let us carefully but briefly review the claims made for each of them, together with their apparent advantages and disadvantages.

The principal claims made for the *flush* method are, that it saves the teeth fully as well, if not better than the *contour;* that it is more quickly done, and hence will be a saving of time to the dentist, and a saving of time and discomfort to the patient; that it is less expensive; and that as more teeth can be filled by it in a given time, the dentist can save more teeth in the course of his practice and consequently do more good.

In regard to the first claim, of its saving teeth fully as well as the *contour* method, we must admit, those of us who have had much experience and have been observant, that the evidences of its efficacy are by no means few or far between. The monuments of its usefulness are constantly brought before our eyes in the form of fillings that have stood for fifty years and less, preventing decay, sustaining all the wear and tear incident to their constant use, and looking as solid and good as they did the day they were introduced. Were it without merit, certainly these fillings, introduced decades of years ago, would not be daily confronting us as they are, speaking in silent eloquence the praises of their performers and the methods they used.

In simple justice, however, it must also be stated that of all the many fillings of this class introduced years ago that have come under our observation, none of them, so far as we can remember, were upon surfaces closely approximating one another. They were mostly upon the crown or buccal surfaces, or upon a surface made equally accessible by the loss of an adjoining tooth. Where they were upon proximate surfaces with no tooth absent, the teeth had been cut and filed to such an extent that there was scarcely a possibility of food remaining between them, and hence their liability to failure through recurring decay almost entirely prevented. Whether these proximate fillings, had they come in contact with each other, would have endured as long is a debatable question; for our own part, we consider it extremely doubtful. If there had been any of this kind they had probably long ago succumbed to the ravages of time.

That *flush* or soft-foil fillings, skillfully introduced (and unless skillfully done no fillings will avail) upon surfaces exposed to the attrition of food or the friction of the brush, will last at least as long as any other kind we have not the slightest doubt. Evidences, too numerous, have convinced us of this fact. Another item in this connection tending to detract somewhat from the glory of the soft-foil filling is, that most of those introduced years ago and remaining to-day were placed in tooth-structure more dense, and consequently more decay-resisting, than much of that with which we have to deal to-day. The other claims—the saving of time and lessening of discomfort in whatever form; the less expensiveness of the operations, and the greater number of them that can be performed in a given time—must, we think, be granted by all. As to the saving of more teeth, that will depend entirely upon their durability in closely approximating surfaces, which will be discussed later on.

Flush fillings are sometimes made with semi-cohesive foil, but generally they are made with non-cohesive foil, used on the wedging principle, which consists in continually forcing the gold previously introduced towards the periphery of the cavity by means of wedge-shaped instruments, and then in turn placing new pieces of foil into the space or spaces thus produced. The foil, either in the form of cylinders or pellets, being soft, readily yields to this lateral pressure, and moves in the direction of the force applied. In this way a very close adaptation of the gold to the margins can be had, and a very dense filling produced. More than this, the instrument never comes in direct contact with the margins of the cavity, and thus the carefully prepared edges are in no danger of being chipped or broken. When it is remembered that nearly all the failures in fillings arise from imperfect adaptation of the gold to the margins, or to the accidental injury of those margins by the plugger in filling, it will be seen that soft foil possesses very decided advantages. Still another advantage, and the last that we shall mention here, is, that it enables fillings to be introduced in almost inaccessible places, by means of curved instruments and the use of the mirror, that could not be introduced with cohesive foil without a large sacrifice of good tooth-material to make the cavity accessible to the direct blow of the mallet.

The disadvantages urged against this method are, that not only cannot a portion of a tooth broken away be restored to its original shape by filling, and thus have its masticating surface increased, but teeth with cavities in them of a compound nature must be cut away so as to reduce them to simple ones, to enable them to be filled on the wedge principle. Another objection urged is, that teeth filed apart to be filled will in the course of time most likely be crowded together again, and then, from the greater amount of surface in contact, decay will recur all the more quickly. Still another objection is, that whether the spaces artificially produced close together again or not, the food lodging in them creates discomfort in eating and makes it difficult of removal. And lastly is urged the unsightliness of the filed teeth and the adjacent spaces.

Now let us see what claims are made in favor of *contour* work. One is, more perfect preservation of the teeth: first, by having no dentine exposed; second, by their touching at one point only, and that point of gold instead of tooth-structure; and, third, by the prevention of the packing and lodgment of food between them. Another claim is, that by the restoration of the original shape of the teeth the masticating surface is greatly increased. Another is greater comfort, in that by their touching at the masticating surfaces the violent packing of food between them is prevented. And, lastly, greater harmony and beauty is claimed, by the avoidance of unsightly spaces.

In regard to the first claim, of the more perfect preservation of the teeth, we believe that (other things being equal) teeth are far less liable to decay where only gold and enamel are exposed than where the more frail dentine is also exposed. Gold cannot decay, and we all know that after decay has once penetrated through the enamel the destruction of the dentine is much more rapid. We also firmly believe that where teeth touch only at a single point their liability to destruction is very much less than where they touch at many points or over a larger surface. While teeth fully restored in shape and touching do certainly prevent the packing of food between them, still food will to some extent find lodgment in the space above, where they do not touch, and if not carefully removed will often cause a recurrence of decay. The other claims, that the masticating surface is increased or kept up to the maximum amount, and that teeth thus filled tend to greater comfort in mastication, and that with their shapes restored, even with the inharmonious color that the gold presents, they are more beautiful in appearance, will, we think, be acknowledged by all.

The objections to this method are, first, the length of time required for these operations, and the consequent exhaustion to both patient and operator, and suffering to the patient; second, their expensiveness, partly from the amount of gold used, but more particularly from the amount of valuable time requisite to their proper performance; and in the third place, most patients will not appreciate our skill and labor after it has been expended. The first objection, the exhaustion of patient and operator, is certainly a most true and valid one, and must be most seriously considered. The second, of expensiveness, will stand or fall according to the financial ability of the patient; while the third, that of appreciation, will be true in many instances, but not in all.

Thus, hastily sketched, are the more prominent advantages and disadvantages of each method. Before deciding to adopt either of them for our practice we should consider carefully the *pros* and *cons* of each, and then be governed by the decisions of our respective judgments. But need we adopt either to the exclusion of the other, as so many are doing, or would it be better to measurably adopt both and practice either, according to the apparent requirements of each particular case?

The objection to methods, as such, consists in the fact that while a method usually contains many features that are useful and practical and worthy of adoption, no method contains all that is good in that particular branch. Each one contains a certain proportion of good and bad features, and it is only in the preponderance of the good over the bad that any can lay claim to superiority. If we adopt any one exclusively we have to accept its objectionable features with its good ones; whereas if we bind ourselves to no theory in particular, but select from the various methods their good features and use them with judgment and discretion, we will probably accomplish a greater amount of good. This eclecticism in practice is, I think, what we all need and should adopt.

But it may be asked, "How shall we know when to practice the one and when the other?" Let us see.

In all simple cavities on any of the three more exposed surfaces of the teeth all fillings are in the very nature of the case contour fillings. On the lingual and crown surfaces they will necessarily be concave, in order to conform to the curved surfaces of the teeth; while on the buccal and palatal surfaces they will necessarily be convex. This will be so whether they be made of either soft or cohesive foil. No effort will be needed to give them these forms; they will naturally assume them. The same may be said of simple fillings on the proximate surfaces, where the adjoining tooth or teeth have been removed. If, however, they should happen to be only flush where the outline of the tooth is convex, it will do no harm, for the preservation of the tooth will be just as complete. This being true, the only debatable question remaining, of a vital character, is in regard to the best method to be pursued in the filling of cavities on the proximate surfaces of adjoining teeth.

In the matter of the six front teeth, if the cavities in them be confined strictly to the proximate surfaces, they may be separated and filled contourly with cohesive foil, or they may be filled only flush with soft foil, and in either case be very well preserved with ordinary care on the part of the patient. If, however, the decay in any case should also involve or necessitate the removal of the cutting edge at the corner, we must be governed in our decision of the manner of filling by the taste and finances of the patient. If the patient prefers the sight of gold to the appearance of a space, and is able and willing to pay for the work, the tooth should be filled with cohesive gold and the broken portion fully restored. Should the patient object to the sight of gold, or not be able or willing to pay for the elaborate work of the restoration, then the surface should be dressed to a straight line and the simple cavity filled with either soft or cohesive foil, whichever the operator thinks he can do the best work with.

In deciding the same question in regard to the bicuspids and molars, besides the considerations just mentioned with reference to the front teeth, two additional items will have to be taken into account. One is, the age of the patient, and the other, the number of teeth in the arch and their proximity to one another. Should the patient be under twenty, and the teeth in consequence be not as dense and able to resist the decay-producing influences always present in the mouth as they would be later in life, and if in addition the teeth should be all present, in line, and touching one another, then we think they ought to be filled contourly and their perfect shape preserved, especially if the proximate decay has gone so far as to include a portion of the masticating surface. For if these teeth should be separated by filing or cutting, the lateral pressure of the other teeth, aided by the soft and yielding character of the alveolus, and sure to be greatly increased by the subsequent eruption and pressure of the wisdom-teeth, will certainly cause the closing of these spaces, and decay will be the result sooner or later. If, however, the teeth be not all present, and those present scarcely or not at all touching, nor likely to become so by the coming wisdom-teeth, then the teeth may be permanently separated and filled *flush*, with a prospect of their lasting indefinitely.

If the teeth to be filled have been previously filed apart and filled, and have not closed together, then they may be filled again in the same way. The likelihood of a recurrence of decay on filed surfaces, and indeed anywhere, is greatly lessened after the patient has arrived at the age of thirty-five or thereabouts, when the dental tissues have reached their maximum compactness and strength.

As a summing up of this whole matter, we would say, in regard to proximate cavities in the bicuspids and molars, if the teeth are in close contact, or in the future likely to become so, fill them *contourly*, and thus preserve their separation at the necks. If, however, the teeth do not touch, nor are likely to, they may be permanently separated and filled *flush*, with equal hope of durability. Such is my practice, and I have been gradually led to it through years of experience and observation.

Discussion.

Dr. E. T. Darby, while expressing his gratification with the whole tenor of the paper, yet did not agree with the statement that the usual positions of successful non-cohesive fillings were the buccal and coronal surfaces; on the contrary, in his experience he had frequently found fillings of ten, twenty, or more years' standing in the proximate faces of teeth which were in close contact; and for illustration referred to the proximate fillings of the late Dr. Elisha Townsend, so many of which are perfect to this day, after having been in service from twenty to thirty years. He further declared his confidence in the value of non-cohesive foil in many proximate cavities, believing the adaptation to the wall to be better than when cohesive foil is used. He recommended the employment of common sense with an appreciation of the requirements of cases before deciding upon the quality and grade of the gold to be used. He also advocated the use of cohesive gold when cases required building out, and thought the practitioner should use that which from the nature of the case promised the best result.

Dr. Daniel Neall was fearful that too many dentists have a greater disposition to practice what may be called decorative dentistry than they have to seek for the means which will best preserve the teeth, and in this connection felt that the strain often imposed upon the patient was out of all proportion to the good accomplished. He defended the use of soft gold.

Dr. Essig advocated, and supported by statement and arguments, the advantages of filling proximate cases by the contour method, and also maintained that ordinarily but little more time was required to operate in this manner than by the flat plan. His procedure, he stated, is to press the teeth well apart and fill to such a form that, when finished, a space remains at or near the gum, the gold being at last in contact near the coronal surface. His views were decided that, without a greater degree of cleanliness than is ordinarily attainable, a recurrence of decay may be expected at the cervical portion of teeth which are permitted to come in contact at or near that point.

Dr. Webb stated that he was glad to have heard Dr. Guilford's essay; he was gratified to find that the essayist, as well as many others who had but a few years ago advocated permanent separations, had now evidently made decided advancement in their modes of operating. He referred to the second article of the "Accepted Creed" (so called), as given with the ten articles of the "New Departure Creed," in which the statement is made that "Some have faith in contour; others faith in separation." With him it was more than a matter of faith. "He knew that the contour method was the best," and his confidence in contour work was strengthened every succeeding year. He thought the essayist had not made the proper distinction between simply saving the teeth, or what remains of them, and fully restoring them to usefulness. He stated that his understanding of contour work is the restoration or building out with gold to the line that bounded, defined, or terminated the original figure, and may be concave in part as well as convex, as in the case of crowns of bicuspids and molars. He did not doubt that if a cylinder of so-called soft foil and one of cohesive foil be used, the non-cohesive one could be more readily adapted by pressure to the cavity; but he believed the proper way to use foil was to fold and cut into narrow strips, and then commence from a definite starting-point and build out with a properly-adjusted electro-magnetic mallet, shaping the tooth as the filling progressed.

Dr. Dixon declared his appreciation and confidence in good contour work, but deprecated its attempt by any but those who thoroughly understand how it should be done, and who have the ability to put their knowledge in practice. He had met with so many attempts in this direction which were so lamentably unsuccessful, they being simply large masses of gold without the proper form, that he would advise all to practice upon plans which will enable them to preserve the largest number of teeth for the longest time, and recommended such practitioners to keep to these simple methods until they felt sure they had acquired the ability to thoroughly do contour operations.

Dr. Bonwill defended the employment of the various new mechanical appliances, maintaining that they were an advantage to both patient and operator, and believed the public also viewed these inventions as among the greatest blessings of the age.

While deploring the necessity for their use, he further stated that the difficulties of making good operations have increased, and that we are brought to face the fact that but few operators have the ability, with the unaided hand, to preserve the teeth by their operations; machinery enabling them to more nearly approach the degree of perfection that the few only have attained without such help.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY THEODORE F. CHUPEIN, D.D.S.

At a meeting of this association, held on the evening of May 13, Dr. Peirce presented a beautiful specimen of the "calcification of the dental pulp," which he had received from Dr. Thomas Lunsford, of Wheeling, West Virginia.

In presenting this specimen, he said it was evidently one of those that had its origin from a pulp-nodule, this having increased until the pulp had become thoroughly calcified, and the pulp-chamber or pulp-cavity literally filled, though the line of demarkation between it and the normal dentine was well sustained. The calcification embraced not only the body of the pulp, but extended well into the roots, and even here it maintained its well-marked peculiarities by differing from that condition where calcification has progressed by addition to the walls of the pulp-chamber, which he recognized as a normal development, and corresponded with the growth which is very properly called dentine of protection or dentine of repair.

In speaking of this affection, when it partook of the form of nodules, he said it often caused the most intense suffering, and owing to the great difficulty in diagnosing its presence, our patients are often necessarily subjected to repeated and prolonged attacks of excruciating torture. In alluding to the specimen before us, he said its development to this extent was of rare occurrence, and when found it would be most frequently observed in the mouths of those having nervo-sanguine or bilio-sanguine temperaments, with good strong constitutions. He also contrasted this condition with that recognized as an effort on the part of nature to protect the pulp from exposure as the tooth was being worn away by the attrition of mastication. The cause of this nodular deposit, he thought, was not fully recognized or understood, and, as compared with the development of the dentine of repair, was more obscure and of rarer occurrence. It is, apparently, the result of some irritation in the dental pulp, and might be likened to the formation of the "pearl" in the oyster, which, it is thought, was due to an irritation caused by a grain of sand or some other foreign body finding its way within the shell of the bivalve, thereby setting up an irritation which resulted in this calcific deposit as an effort of self-protection.

Dr. Buckingham thought the ossification of different tissues was due to certain conditions of the system, or to certain excitements under which a person labored. When the pulp of a tooth became ossified, it seldom or never adhered to the dentine next to which it was formed. What was the cause of this in the case of nodules in the pulp is not known conclusively, nor is its complete ossification, as in the case of the specimen presented, satisfactorily accounted for.

Dr. F. M. Dixon questioned if recession of the dental pulp did not go on all through life, as he had met instances where all trace of the pulp, and nearly all trace of the pulp-chamber, was lost by the gradual deposit of bony matter. He therefore doubted if it ceased at any period of life. He had noticed, in the operation of extracting the nerve after devitalization, that in passing the probe or nerve-broach, this could not be carried into the roots nearly so far in the teeth of old persons as it could in those of younger ones, and he concluded that there was an obliteration of the dental foramina, or that these were markedly diminished.

Dr. Peirce said he believed there was but a very limited time in which the teeth remained stationary. Calcification progressed gradually and continuously, modified only by the same laws governing nutrition in other parts, until about the twenty-fifth year, when it was probable that there was a cessation or resting of this calcifying process; but soon after begins the destructive period, and a removal of the external protection must have a concomitant and corresponding building up within to compensate for the loss of the cusps and gradual removal of the enamel by attrition in mastication. This work of building up within is but a renewal of the original process, and has been called into activity again through the unerring response of the tubular dentine, which is now fast being deprived of its normal protection. This nutritive process goes on continuously, until we not only have the pulp-cavity much reduced in size, but the root-canals also are in time nearly obliterated. Here we have finely illustrated the beneficial results of the development of what may very properly be called the "dentine of repair."

Dr. Buckingham said, we should not confound the calcification of the pulp with the normal growth of dentine. This, he believes, grows constantly—or with only slight seasons of rest—all through life. At first it was a mere shell, the whole interior of the tooth being pulpy; but this gradually shrinks, inclosing itself as a silk-worm does within its cocoon. In the case of calcification of the dental pulp, or of the nodular formation within the pulp-chamber, there seems to be a form of irritation in this organ which induces this result. Secondary dentine may be produced by the wearing down of teeth much subjected to the force of mastication, an irritation of the pulp being thus set up; a close contact of external influences causing the pulp to recede and throw off new bony matter as a means of self-protection. The characteristics of these tissues were apparent. *Primary* dentine was of a different color from *secondary* dentine. Dentine as we find it in its *primary* formation was opaque and of a slightly yellowish tinge, while *secondary* dentine was nearly transparent and of a vitreous hue. *Primary* dentine had a natural and regular growth, while *secondary* dentine was spasmodic, irregular, and but occasionally met with. The calcification of the dental pulp or nodular formations within its chamber were almost sure to produce neuralgic pains of the most intense character. Whether we examine dentine in old or young teeth the same characteristics are observed, viz., its color, opacity, and the fibrillæ which permeate its entire substance. But this calcification of the pulp has very little resemblance to normal dentine. It partakes more of the nature of bone, for its microscopic examination reveals Haversian canals, lacunæ and canaliculi, none of these being observable in the normal dentine.

Dr. Peirce also spoke of another condition which accompanied the induration of the teeth. The local appearances are: teeth large and yellow; gums spongy, turgid or thickened, and purplish in color, with pus exuding under pressure around the necks of the teeth; tartar generally, though not always, found in modified nodules on or around the roots. When present it greatly exalts the abnormal symptoms. This disease occurs in middle life, though sometimes earlier; yields to no treatment. The most we can hope to accomplish is to modify its progress, but sooner or later the teeth or tooth so affected must loosen and drop out, unless for comfort they have been previously removed. Such teeth, if carefully examined, will be found to be largely solidified or indurated; but notice! it is not the result of abrasion, attrition, or the loss of tissue from any cause; on the contrary, they are generally found intact, anatomically without imperfection. This he designated a pathological condition, resulting largely from a systemic cause, observed most frequently in what may be termed patients of a rheumatic diathesis, affecting first, as a usual thing, the superior first molars and bicuspids and the lower incisors.

UNION MEETING OF NEW ENGLAND DENTISTS.

In response to invitations sent out by the Massachusetts Dental Society to all of the dental societies in New England for a joint convention to be held in Boston, a large number of the profession met in Wesleyan Hall, June 5. Eleven societies were represented by dentists from each of the New England States. The meeting continued for two days, each session being well attended. At times nearly two hundred were present, among whom were many of the representative men now in practice. Several distinguished visitors from outside of New England were also present and took part in the discussions.

The convention was organized by the choice of Dr. L. D. Shepard, president of the Massachusetts Society, for president, with the presidents of all the societies represented for vice-presidents. The secretary of the Massachusetts Society was chosen secretary, and the secretaries of the other societies assistant secretaries.

The convention comprised the following-named societies:

Massachusetts Dental Society, New Hampshire Dental Society, Connecticut Dental Society, Maine Dental Society, Vermont Dental Society, Rhode Island Dental Society, Connecticut Valley Dental Society, Merrimac Valley Dental Association, American Academy of Dental Science, Boston Society for Dental Improvement, and the Harvard Odontological Society.

The committee of arrangements prepared an ample programme, which was carried out with signal accuracy and dispatch. The time of the meetings, with the exception of that required for the transaction of the necessary business, was devoted entirely to the reading and discussion of papers.

The programme announced thirteen essays, and of this large number all but one were read and discussed. The essays were as follows:

"Deciduous Teeth," by Dr. J. F. Adams, Worcester, Mass.

"The Use of Soft Foil," by Dr. A. W. Buckland, Woonsocket, R. I.

"A Translation," by Dr. T. H. Chandler, Boston, Mass.

"Success in Operating not obtained by Heroic Treatment," by Dr. J. T. Codman, Boston, Mass.

"Methods of Practice, by an Eye-Witness," by Dr. C. G. Davis, New Bedford, Mass.

"The Present Status of Dentistry," by Dr. T. Haley, Biddeford, Maine.

"Uterine Disturbances as Affecting the Oral Cavity," by Dr. E. B. Hitchcock, Boston, Mass.

"Dental Ethics," by Dr. J. W. Jarvis, Claremont, N. H.

"Diseases of the Maxillary Sinus," by Dr. Geo. L. Parmele, Hartford, Conn.

"Diagnosis," by Dr. F. Searle, Springfield, Mass.

"Economy," by Dr. T. D. Shumway, Plymouth, Mass.

"General Care of Mouths for Patients under Twenty Years of Age," by Dr. L. C. Taylor, Hartford, Conn.

A paper, "Why the Practice of Dentistry should be Protected by Law," by Dr. H. Hill, of Manchester, N. H., was expected, but Dr. Hill was at the last minute prevented from being present. Much interest was felt on this subject and general regret expressed that the paper could not be heard.

Much enthusiasm was manifested, and the meeting was one of great value to all present, and it was voted to refer the subject of a future meeting to the presidents of the various societies.

Votes of thanks were extended to Dr. J. H. Batchelder, who first suggested the idea of the union meeting, to the presiding officers, and to Drs. C. H. Osgood and A. M. Dudley, chairman and secretary of the committee of arrangements, who labored so successfully to promote the interests of the convention.

Dwight M. Clapp, *Secretary.*

HARVARD ODONTOLOGICAL SOCIETY.

The first annual meeting of the Harvard Odontological Society was held at the Revere House, Boston, on the afternoon and evening of July 2, 1879, the president, Dr. W. E. Page, of Charlestown, in the chair.

After an oration by Dr. J. G. W. Werner, essays by Drs. H. F. Hamilton and D. F. Whitten, with the usual festivities, and a poem by Dr. E. B. Hitchcock, the following officers were elected for the ensuing year:

President.—Dr. D. F. Whitten, South Boston.

Recording Secretary.—H. F. Hamilton, Boston.

Corresponding Secretary.—W. E. Page, Charlestown.

Treasurer.—H. F. Dunkel, Boston.

Prudential Committee.—Dr. H. F. Hamilton, Boston; Dr. M. K. Rand, Boston; Dr. Frank Perrin, Boston.

The retiring president then delivered his address, and the society adjourned.

W. E. Page, *Corresponding Secretary.*

RHODE ISLAND DENTAL SOCIETY.

At the annual meeting of the Rhode Island Dental Society, in Newport, July 1, 1879, the following officers were elected for the ensuing year:

President.—Dr. C. A. Brackett, Newport.

Vice-President.—Dr. A. W. Buckland, Woonsocket.

Secretary.—Dr. L. L. Buckland, Providence.

Treasurer.—Dr. W. P. Church, Providence.

Librarian.—Dr. S. E. Greene, Newport.

Executive Committee.—Drs. A. W. Buckland, W. H. Thornton, and William Barker.

The roll of active members was increased by five new names.

L. L. Buckland, *Secretary.*

AMERICAN GRADUATES IN LONDON.

A meeting of graduates of American Dental Colleges was held in London, at the residence of Dr. Wedgewood, George Street, Hanover Square, on June 13, to protest against the decision of the Royal Medical Council in refusing to register the diplomas of certain American colleges, which, according to the Dental Act, they were entitled to do.

The only institutions recognized by the council are the Universities of Harvard and Michigan, on the grounds that they demand of all students a preliminary examination in general erudition before matriculation, and a three years' course before graduation.

Drs. Waite, Dally, Pritchard, Redman, Visick, Packe, Elliott, Knott, Field, Saunders, Muridge, and others were present. A committee was elected, viz., Drs. Coffin, Pritchard, Wedgewood, and Packe, to take action in the matter.

EDITORIAL.

THE ANNUAL CONVOCATIONS.

The American Dental Association will hold its nineteenth annual session, August 5, 6, 7, and 8, 1879, at Niagara Falls.

The American Dental Convention will hold its twenty-fifth annual session at Saratoga, commencing August 12, 1879.

ANOTHER ADDITION.

Again and for the third time this year the pressure of accumulated matter claiming space in the Dental Cosmos compels us to add eight pages to the reading department. This statement will also explain the non-appearance of several reports and communications which have been received.

BIBLIOGRAPHICAL.

Laboratory Teaching, or Progressive Exercises in Practical Chemistry. By Charles Loudon Bloxam. Fourth Edition. With eighty-nine Illustrations. Philadelphia: Lindsay & Blakiston, 1879.

The reputation of Professor Bloxam would be sufficient guarantee for the excellence of this little work, if that had not already been determined by its extensive and satisfactory employment in the teaching of practical chemistry.

The book, without presupposing any special chemical knowledge on the part of the student, gives plain and intelligible directions for the analysis of unknown substances of all kinds, including organic bodies; and these directions are so clear and so well arranged that it would be really possible for a beginner who followed them intelligently to determine any single substance submitted to him for analysis. In addition there are scattered through the book simple instructions relative to chemical manipulation and apparatus. There are valuable tables for the use of the blow-pipe; directions for the purchase and preparation of the tests most in use, and a series of excellent exercises, which we have never seen surpassed for simplicity and logical arrangement.

Memoranda on Poisons. By Thomas Hawkes Tanner, M.D., F.L.S. Fourth American, from the last London enlarged and revised edition. Philadelphia: Lindsay & Blakiston, 1879.

This is a compact, comprehensive, systematic, and, within its scope, complete manual of toxicology. The classification, detection, diagnosis, mode of action, and treatment of poisons are tersely and plainly considered. It is such a convenient and methodical arrangement and presentation of the subject that it might well be found in every library.

OBITUARY.

DR. J. OSBOURN EDWARDS.

Died at Gadok, Island of Java, December 29, 1878, Dr. J. Osbourn Edwards.

Dr. Edwards was a graduate of the New York College of Dentistry, —class 1875–76,—and was practicing successfully in Batavia, Java, until three months before his death.

VULCANITE LITIGATION.

Supreme Court District of Columbia.

ABANDONMENT OF PATENT—CELLULOID NOT AN INFRINGEMENT.

THE GOODYEAR DENTAL VULCANITE CO. } No. 5060.
vs.
OWEN H. BRIGHTWELL. } IN EQUITY.

The decision of the Supreme Court in Smith *vs.* Goodyear Dental Vulcanite Company, 3 Otto, 486, holding that the letters patent issued to John A. Cummings, June 7, 1864, and reissued in March, 1865, for an improvement in artificial gums and palates, are valid, must be regarded by this court as a final determination and making the said letters *res adjudicata.*

Held, also, that the *use of celluloid* in the fitting of artificial teeth *is not an infringement* of that patent.

The history of this invention and the litigation in relation thereto are sufficiently stated in the opinion.

John H. B. Latrobe, of Baltimore, B. F. Lee, of New York, and A. Pollok, for complainants.

J. A. Maloney, A. L. Merriman, and E. Lander, for defendant.

Mr. Justice Hagner delivered the opinion of the Court:

The complaint was filed in July, 1876. It alleges the granting of a patent in 1864 to Dr. Cummings for an improvement in artificial palates and gums, and the reissue of that patent in 1865, and subsequent reissues and assignments, in virtue of which the complainants are its present proprietors. It refers at considerable length to a number of cases decided in the different courts of the country in which, as it is said, the validity of the patent with respect to the use of hard rubber or vulcanite has been distinctly affirmed. It also avers that in other enumerated cases decisions have been made declaring that the use of celluloid in the fabrication of such articles is an infringement of the patent; that the defendant has been guilty of infringement in the manufacture of dental plates of vulcanite, of rose pearl, and of celluloid; and it prays for an injunction and account against him in the ordinary form.

The defendant filed an answer, a supplemental answer, and a further answer in the nature of a cross-bill. In these pleadings he alleges that the Cummings patent and the subsequent reissues are invalid because of manifold irregularities attending the proceedings in the Patent Office; that Cummings was not originally entitled to the patent, because he was not the inventor, but obtained whatever knowledge he possessed on the subject surreptitiously from others; and the pleadings set forth that several persons, among whom are Nelson Goodyear, Hæring, and Bevin, were prior inventors of the matter claimed in the patent. He further insists that the patent ought not to have been issued because the matter claimed had been in public use for more than two years before the application of Cummings, and with his knowledge, and that whatever claim Cummings may have had to the invention in its inception was abandoned by him during the interval between 1852 and 1864. He avers that the judgments in some of the suits mentioned in the bill should not be regarded as binding, because they were undefended, or decisions were rendered therein by collusion of parties. He denies that celluloid and rose pearl are equivalents of the hard rubber or vulcanite, which was claimed by Cummings in his patent and specifications, the substances and processes of using the same being different, and he admits that he has made sets of artificial teeth in bases composed in some instances of vulcanite or hard rubber, and in others of celluloid.

A large number of witnesses were examined by the parties, and by agreement certain portions of the record in the Gardiner case were admitted in evidence, and Dr. R. Finley Hunt was permitted to explain in the presence of this court the method pursued by him in the manufacture of artificial plates and gums from celluloid.

All the questions involved were elaborately argued by the distinguished counsel who appeared for the parties, and have been carefully examined by this court.

The first question presented for our consideration is whether, upon the facts of this case, the defendant is liable for an infringement in the use of dental plates *of hard rubber or vulcanite;* and this involves the inquiry as to the validity of the Cummings patent for any purpose whatever.

When the bill was filed in this cause there had been no decision upon the question by the Supreme Court of the United States. But since that time the case of Smith *vs.* Goodyear Dental Vulcanite Company has been determined by that court, and an elaborate and able opinion pronounced by Mr. Justice Strong (three judges dissenting), declaring that there was no abandonment by the patentee of his original application; that the invention was never abandoned to the public, and that the reissued letters patent of 1865 are valid. 3 Otto, 486.

It is claimed on the part of the complainants that this decision is a final determination of the point, which is henceforth to be regarded as *res adjudicata.*

This view is so clearly in the direction of the principle of public justice, that declares it to be the interest of the Republic that there should be an end of the strife, that we should without further discussion adopt it as settling this point, except for the earnestness with which it is insisted on the part of the defendant that the case now presented differs so materially in many important particulars from Smith's case, when that was before the Supreme Court, that we should be justified upon the facts before us in declaring the patent invalid.

It is true that on every suit for an infringement it is competent for the defendant to dispute the validity of the original patent, and present in defense such objections as are set forth in the answers in this case. But we do not think that this principle would justify a circuit court in deciding upon such objections virtually to reverse a judgment carefully enunciated by the Supreme Court, upon a state of facts similar in character. *In Smith's case, the defendant set forth* *all the objections to the patent which are here insisted upon; its want of originality, its abandonment by Cummings, and the imperfections and irregularities attending its issue. The present defenses, though differing as to the names of the persons by whom it is alleged the improvement claimed was invented, and as to the witnesses who are examined, many of whom appear, so far as we can ascertain, to have testified for the first time in this case, are yet the very matters which were passed upon, though on a different state of proof, by the Supreme Court.* The circumstance that Nelson Goodyear is named in this case for the first time as the inventor; that additional persons are designated in this case as having been acquainted with the prior use of the thing patented; or that a number of witnesses, not heretofore examined, testify in this case in support of these pretensions; and that Cummings, so far from having been prevented by poverty from prosecuting his claim before the Patent Office, as was established by the testimony in Smith's case, was abundantly able to incur such necessary expenses, are not sufficient to bring us to the opinion that upon these additional allegations and facts the Supreme Court would reverse their rulings, announced after careful consideration of similar defenses. There are probably few cases of patents affecting important interests where the question of want of originality has not been raised, and doubtless in many instances with entire sincerity and honesty on the part of the claimants. When necessity, the real mother of invention, demands some improvement upon the existing methods, men of genius in all parts of the world are stimulated to a simultaneous examination of the same subject, and the tide of invention advances all along the coast of scientific inquiry with a nearly uniform movement. Such is the well-known history of the concurrent investigations that resulted in Morse's invention of the telegraph. When the Supreme Court, in the case of O'Reilly *vs.* Morse, 15 How., 62, determined the validity of the Morse patent, there were but five claims of prior inventors considered by the court. But the consideration of these rival pretensions involved a thorough examination of the entire question, and resulted in a deliberate judgment in favor of Morse.

From that time forth, no inferior court would have been justified in departing from that judgment until reviewed by the Supreme Court itself, notwithstanding claimants of the invention should in succession present their pretensions, supported by additional proofs even strong enough to produce grave doubts in the minds of the court. It is proper, therefore, that the questions decided in Smith's case should be considered as settled in this court. As the defendant has admitted that he has manufactured plates of vulcanite or hard rubber, the complainant is entitled to an injunction to prevent further fabrication of plates of that material, and to the usual decree for an account in respect to such infringement.

The question as to the use of the celluloid is a different one. It is insisted by the defendant that in no view can that substance be regarded as within the patent of Cummings; and to determine this it is necessary to scrutinize that patent, with the specifications, to ascertain precisely its extent and scope.

The caveat filed by Dr. Cummings in 1852, in the Patent Office, sets forth the difficulties which had hitherto been experienced in the fitting of sets of artificial teeth, and declares that his improvement consists in forming the plate and gums, into which the teeth are to be inserted, "*of rubber or some elastic substance, so compounded with sulphur, lead, or similar substances as to form a* hard gum or whalebone gum."

In 1852, Dr. Cummings filed a specification of his invention in which he uses this language:

"The present invention consists in forming the plate and gums, to which the teeth are attached, of *rubber* so *vulcanized* as to be rigid enough for mastication. . . . The teeth being imbedded in the elastic material, while the said material is in a soft condition, and then baked with the gums and plate," etc. Again: "The plate and gums are formed in one piece, and *of rubber, or of rubber and the compounds commonly* employed therewith, which can be reduced to a soft condition, and then *vulcanized or hardened* sufficiently to answer the purposes." . . . "The teeth, gums, and plate being thus connected, are then baked until the *rubber* becomes sufficiently vulcanized," etc. And finally he says: "What I claim as my invention and desire to have secured to me by letters patent is, forming the plate and gums in which the teeth are inserted in *one piece of rubber* (or other elastic material or materials), which can be hardened sufficiently for the purpose of mastication," etc.

Accompanying that is a certificate from F. A. Bevin, who states that he had worn a set of teeth, constructed on the principle of Dr. Cummings, on "*an India-rubber plate*," and declares that the elasticity and texture of the *India-rubber* make it more congenial to the mouth, and certifies with confidence in regard to the value of *India-rubber* for dental substitutes.

In July, 1855, Dr. Cummings, in an amended specification, uses this language:

"My improvements in the manufacture of sets of artificial teeth . . . consist in combining them *with rubber*, etc., which is *vulcanized* after the teeth are inserted. . . . The *vulcanized rubber* may be made nearly as hard as bone," etc.

And in the conclusion of this specification he says:

"What I do claim as my invention and desire to have secured to me by letters patent is the improvement in the manufacture of sets of mineral or other artificial teeth, which consists in combining them with a *rubber palate and gums* which, after the insertion of the teeth, are vulcanized by Goodyear's process or any other process," etc.

In August, 1855, Dr. Cummings's attorney, in a communication urging a reconsideration of the commissioner's rejection of the application, says:

"In originating this invention, Mr. Cummings supposed that he was the first in the use of mineral teeth, etc., *with a gum* which becomes plastic by heat and hardens by cooling, but he had always intended to use the *vulcanized rubber* as the best material," etc.

The commissioner in his reply discusses the availability of caoutchouc and says:

"Furthermore, the *India-rubber you employ* must be treated by one of the known vulcanizing processes," etc.

In January, 1856, the attorney of Cummings again writes to the Patent Office appealing to the commissioner from a further rejection, and says:

"The combination of the mineral or other teeth with *India-rubber* (to be *vulcanized* after the teeth are inserted) makes a new article of manufacture," etc.

The reply of the examiner affirming the rejection adopts the language of the preceding application in speaking of Cummings's claim: "*India-rubber* to be *vulcanized* after the teeth are inserted."

In 1864 another specification is filed by Cummings, through the whole of which the only substance mentioned is *hard rubber* or *vulcanite,—i.e.*, an elastic material, "which can be hardened sufficiently for the purposes of mastication."

In April, 1864, the commissioner of the Patent Office addressed a letter to Dr. Cummings, in which he refers to the last of three prior rejections of his patent, and uses this language:

"It appears that a satisfactory reference was then given to the use of gutta-percha, and a disclaimer to it made by you, while your present claim and specification is broad enough to cover it. . . . Your claim was *then confined to what was known as hard rubber*, now *called vulcanite*. . . . In justice, therefore, to your rights as an inventor the office will not object to the admission of a claim *limited to the use of this material* for this purpose."

The patent was granted on June 7, 1864; and the schedule therein referred to, which consists of the amended specification, has the same reiterated reference to hard rubber and vulcanite. On the 10th of January, 1865, there was a reissue of this patent, which recited that Dr. Cummings had assigned his title to the improvement to the Dental Vulcanite Company, and the patent was reissued for the improvement, referring to the annexed schedule, in which Dr. Cummings again repeated with fullness the particulars of his invention; and fourteen times in that specification the substance referred to is spoken of as *rubber, hard rubber, or vulcanite.* The concluding sentence of the specification varies somewhat from that adopted by him in any previous specification, and reads in this way:

"Having thus described the method I have used for making and using such *hard rubber or vulcanite plates*, what I claim herein and desire to secure by letters patent is the plate of *hard rubber, vulcanite, or its equivalent*, for holding artificial teeth or teeth and gums, substantially as described."

The reissue in March, 1865, to the Dental Vulcanite Company, with the accompanying specifications, is in the same language.

These citations embrace the descriptions employed by the inventor and his assignees, in their intercourse with the Patent Office, of the substances to be used in the fabrication of the thing patented.

We will now examine how the substance is described by the patentee and his assignees in their transactions outside the office.

In May, 1864, before the patent had issued, Dr. Cummings undertakes to assign to Joseph Gavett one undivided eighth part of the property of his said invention, and letters patent which may be granted therefor, and this assignment recites that "I, the said Cummings, have invented a new and *useful rubber plate*, for which I have made application," etc. And in July of the same year, Cummings and Gavett, with others, in consideration of $488,000, paid them by the Dental Vulcanite Company, transferred to that company the patent there spoken of by this description: "The said patent and all improvements that have heretofore been made or hereafter may be made by any or all of us in the use of *hard rubber and gutta-percha for dental purposes*."

In December, 1867, a certificate of incorporation was filed in the proper office in New York City by John H. Cheever and others, expressing their desire to form a company under the corporate name of the Goodyear Dental Vulcanite Company, setting forth the object of the incorporation as follows: "The objects for which said company is to be formed are to manufacture and vend *the hard compound of vulcanized caoutchouc or India-rubber and allied gums, so far as the same is applied to dental purposes or dentistry, and for the purpose of manufacturing and selling artificial gums, plates, and palates made from said hard compound*."

In all the specifications filed by Cummings reference is made to the patent granted in May, 1851, to Nelson Goodyear, for the manufacture of hard rubber or vulcanite, as describing the mode of manufacturing the substance to be used in the preparation of artificial palates; and that patent describes very carefully the method pursued by Nelson Goodyear, and shows that the materials used by him were rubber and sulphur, which he declares to be indispensable ingredients in its manufacture. And the assignment to the complainants of the right to make this material of vulcanite, which is made in May, 1866, by the administrator of Nelson Goodyear, speaks of the matter to be assigned as an "improvement in the manufacture of India-rubber and allied gums." The very name adopted by the company would seem plainly to indicate that its operations were designed to extend only to the use of *vulcanite*.

It seems to us sufficiently clear from these facts that what was in the mind of Dr. Cummings and of these parties, and of the authorities of the Patent Office at the times referred to, was *vulcanite or hard rubber*, or some substance not essentially different from it in origin or characteristics.

It seemed to be contended on the part of the complainants that the expression in the specifications filed with reissues of January and March, 1865, "or its equivalent" may be considered as enlarging the scope of the original patent so as to embrace celluloid. But it is well settled that the reissue of a patent cannot extend to embrace matters not included in the original patent. In the language of the Supreme Court, in O'Reilly *vs.* Morse, 15 Howard, 112, "It was issued by the proper lawful authority, and it was the duty of the Commissioner of Patents to see that it did not cover more than the original invention."

Can celluloid be considered in any way an equivalent, in the proper signification of the term, of hard rubber or vulcanite? It is not composed of India-rubber or any kind of gum. We are told it is formed from solid collodion, which is made by the treatment of vegetable fiber, as cotton, with nitric and sulphuric acid. This solid collodion, when treated with ether and heat, forms a substance known in commerce as *rose pearl*, while the collodion treated with gum camphor forms *celluloid*. But it is clear that any "equivalent" must be used in the manner described in the specification in the original patent; and it is equally clear, from the evidence adduced in this case, that it would be practically impossible to pursue with celluloid the process of fabrication described by Dr. Cummings as necessary to the use of his invention. The dentist who intends to use the vulcanite or hard rubber according to Dr. Cummings's method fills the mold or plaster cast, in which the teeth are set up, with soft rubber treated with sulphur according to Nelson Goodyear's process, and then with his fingers, or otherwise in a manner involving a certain degree of personal dexterity, molds the rubber while in a plastic state to the proper form for gums surrounding the teeth. The soft rubber thus placed in contact with the teeth is then exposed to the process described by Nelson Goodyear's invention, and in that process is hardened or vulcanized. In the use of celluloid, according to Dr. Hunt's testimony, the dentist, after preparing the pattern or mold, and setting up the teeth in the proper form supported by plaster and wax, uses a "blank" made of celluloid, which has been sold to him from the manufacturer, this "blank" being a hard plate somewhat resembling in consistency a piece of stiff glue. He selects a blank which conforms most nearly to the shape of the patient's mouth, and places it in the mold against the teeth. It would be impossible for him, in manipulating this stiff substance, to conform to the method pointed out in Dr. Cummings's specifications. Neither with the fingers nor with any other instrument could he form the gums by pressing the hard celluloid blank into immediate contact with the teeth. Instead of doing this, after he has placed it in the mold and without first subjecting it to heat by water or otherwise, he screws down the top of the flask or mold, and then for the first time subjects this hard substance to heat, the effect of which is to melt or render plastic the hitherto stiff form of the blank. As the melting progresses he is enabled to screw the top of the flask down tighter, provision being made for the escape of superfluous material at the sides; and after a sufficient interval of time the process is completed, the artificial palate and gums are removed from the flask, and the teeth are found imbedded in the celluloid.

This mold seems to us to be just the reverse of the processes described in Dr. Cummings's specifications.

The Supreme Court, on p. 493 of 3 Otto, says:

"The process detailed is thereby made as much a part of the invention as are the *materials of which the product is composed.*"

In the opinion of the Supreme Court, therefore, the character of the *materials* of which the product is composed is necessarily involved in the invention itself, and it is impossible to comply with the requirements of the invention without the use of the materials pointed out in the specifications.

It is said by the complainants that the use of celluloid is as old as the date of the Cummings patent, and that therefore, its use for artificial palates was allowed under the Cummings patent, and its unlicensed use by dentists is an infringement of the patent. We cannot see how this circumstance could produce this effect, even if the alleged fact appeared in evidence, unless it also appeared that celluloid was one of the substances embraced in the patent. But in the case before the court there is no proof of the common use of celluloid at the date of the patent. On page 31 of the complainant's brief it is stated that "it appears from the evidence that celluloid, or solid collodion, was well known at the date of the plaintiff's patent as a substitute for vulcanite for the general purposes of the arts, including this specific purpose;" but the references made in the brief to page 6 of the complainant's record fail to sustain this assertion. The testimony to be found on that page says nothing at all as to the length of time celluloid has been in use; and, after careful examination of the entire case, we have found no evidence bearing at all upon the point, unless it is furnished by the three patents to Parks, Mackintosh, and Hyatt, which are contained in the complainant's record. The patent to Parks, granted in Great Britain in 1856, embraces claims for several matters which would require separate patents in this country, but which, it appears, according to the English practice, can be embraced in one patent. One of these matters is the treatment of collodion with ether and heat, producing the substance known as *rose pearl.* And this it is which Mackintosh, in his specification in 1860, claims to apply to the fabrication of artificial palates in dentistry. But *rose pearl* is a different substance from celluloid, being formed, as we have stated, by the treatment of collodion with ether and heat. The only evidence which at all would go to fix the date of the invention or use of celluloid, to be found in any of the records or testimony, is the patent of the Hyatts, granted by the United States in 1870, which describes the fabrication of celluloid by the treatment of collodion with gum camphor, forming celluloid, the subject now under examination, and declares that the patentees claim to be the inventors of the improvement, which had not previously been known.

We have thus far considered the question without direct authority upon the point under consideration. It has never been presented to the Supreme Court of the United States, but we have been referred to two decisions in the circuit which are directly at variance in their conclusions. In view of this diversity of views by these learned judges we have thought it best to examine the case at bar for ourselves, though at inconvenient length.

On the 5th of October, 1877, Judge Shepley delivered an opinion, characterized by his known ability, in the United States District Court of the District of Massachusetts, in the case of the Goodyear Dental Vulcanite Company *vs.* Davis and the defendants in sixty-seven other cases. In these cases the learned judge distinctly held that the Cummings patent was not infringed by a plate made of celluloid, the product and the process being essentially different. In this opinion the judge says:

"The defendants use, in making their set of artificial teeth, a plate made of celluloid, substantially a new material, discovered and patented since the date of the Cummings invention. This substance is compounded of cellulose, or vegetable fiber and camphor. No rubber or other equivalent gum, and no sulphur or equivalent for sulphur, in the process enter into its ingredients. It is not a vulcanizable compound, and contains no vulcanizing agents in its composition. The camphor in its composition, instead of being a vulcanizing agent, causes the composition to soften instead of harden under the influence of heat. The product when compounded, and before being subjected to heat, is not soft like soft rubber under like conditions, but hard."

The other opinion referred to is that of Judge Wheeler, delivered in the same month in the New York circuit, in the case of the Goodyear Dental Vulcanite Company *vs.* Preterre. Judge Wheeler declares that in the case before him:

"It appears from the evidence that celluloid and rose pearl in use by the defendant, whether actually the same as that material in that case or not, were well known at the date of that invention."

And again:

"That the evidence is full that celluloid and rose pearl, with their melting and other qualities useful to this manufacture, were well known at the date of the invention and patent of Cummings."

The judge, however, declares that if the cases of Davis *et al.*, decided by Judge Shepley, were exactly like the case before him, the decision would exercise a great and controlling weight with him. In the case at bar there is no such evidence, as we have stated, of the antecedent invention of celluloid as Judge Wheeler found in the case of Preterre, and therefore the present case conforms rather to the decision of Judge Shepley in the sixty-eight cases referred to.

It has been urged upon the court that we should adopt this decision of Judge Wheeler, followed as it was by the judgment recently delivered in the circuit court, in the District of Maryland, upon the ground of comity, which it is said governs circuit courts, when they are referred to decisions of other circuits, upon a state of facts similar to that appearing before them. This idea of comity does not seem to have controlled the decision of Judge Wheeler, and upon the ground stated by him that where a suit is brought for an infringement, the decision must depend upon the evidence in the particular case, and it is only when the facts of the cases are alike that one ought to control the other.

Finding the facts in the case at bar more nearly resembling those in the case decided by Judge Shepley, and concurring with him in his reasoning and conclusions, our decision coincides with that announced by him in the cases referred to, that the use of celluloid is not an infringement of the Cummings patent held by the complainants.—*Washington Law Reporter.*

HINTS AND QUERIES.

Reply to C. B. R , who asks for Atkinson's method of bleaching teeth. Clean out well, and fill the root or roots with oxychloride of zinc. After excavating away all the discolored dentine you can spare, fill the chamber with powered alum, and wet it with Labarraque's solution of chloride of sodium, known as "Java water" by laundresses. A few minutes will bleach it out. Repeat, if necessary, once or, sometimes, twice. Be faithful and you will succeed.—A.

In answer to D. C. G., who inquires in the July number of the Dental Cosmos, "How can liquid silex be restored when it has become thick, and in consequence useless?" Put a little snow- or rain-water in your bottle, and it will have the desired result.—A. F. F.

Treatment of Exposed Nerves in Deciduous Teeth.—The almost constant demand made upon dental practitioners to treat the temporary teeth with a view to their preservation suggests a full discussion as to the best methods indicated in such cases. That a child affected with an exposed pulp suffers pain at least equal to that which an adult suffers from a similar lesion of a permanent tooth is not to be doubted. Yet, notwithstanding the many essays which have been written relative to thoroughness in dental operations, there are no professional services rendered by dentists that are performed in a more indifferent manner than the treatment of the deciduous teeth. An adult patron brings a child of tender years to the dentist. Examination reveals an exposed and exquisitely sensitive pulp. A sedative application is made, generally affording prompt relief, and the little patient is dismissed, generally without even a suggestion concerning additional treatment in order to insure permanent comfort and usefulness of the organ. Why not, having reduced the inflammatory condition, cap and fill as would be done with a permanent tooth? Instead of this, and as a result of the palliative treatment, only a few weeks elapse before the child is again presented, most likely with a full-fledged alveolar abscess. If then the question be asked, Cannot something be done to procure permanent relief? the assurance is given that the abscess can be cured and the tooth filled. Thus the child has been allowed to endure the tormenting pain of the suppurative process, and, after the pulp is thus disposed of, the tooth may be finished up on general principles. But why should the pulp have been allowed to die after this fashion? Why not have employed arsenic and devitalized it? Take, for example, an exposed nerve in a deciduous molar not suitable for capping, and which ought normally to be retained in the mouth for two or three years, what shall be done with it? Garretson says that the application of arsenic to such a pulp is not to be thought of. Harris and other authorities leave us entirely at sea concerning the conservative treatment of such teeth. We have been taught that arsenical application in such cases is extremely hazardous, because of the open and large foramen. Yet in similar lesions of the sixth-year molars, this same agent is very generally employed. It would appear to be quite as safe to destroy the pulp in this manner in a temporary tooth as in a sixth-year molar; to empty the pulp-chamber and fill in the usual way, and with the same hope of success in the former case as in the latter. It may be urged that the roots of devitalized teeth are not absorbed, and that for that reason such practice would be objectionable. But deciduous teeth having lost their vitality from other causes, are allowed to remain in the mouth without fear of their exercising any untoward influence over the absorptive and eruptive processes. I submit, therefore, whether the direct application of arsenical paste with due precaution is not allowable in a large percentage of such cases, and if it does not promise good results as a choice of evils. For nearly two years I have followed this practice, and my success has been most gratifying. Of course I have proceeded with great care, and due consideration of age, temperament, texture and condition of the tooth in each individual case, placing the drug without pressure in direct contact with the pulp, and sealing the cavity with the utmost care to prevent the possibility of oozing. I have rarely attempted to destroy pulps in the temporary teeth in this manner earlier than five or later than nine and a half years; confining my practice generally to deciduous molars at and subsequent to the sixth year. As yet I have not had the first unfortunate result. Comments and criticisms on this practice are desired.—S. ARTHUR GARBER, D.D.S.

WATER-TIGHT GUTTA-PERCHA FILLINGS.—I notice occasionally in the journals remarks implying the liability of leakage around gutta-percha fillings. There is no need of such leakage, if the cavity be first made perfectly dry, and then brushed with a thin varnish of resin (common rosin) dissolved in chloric ether or chloroform. During over thirty years' use of gutta-percha compounds for temporary treatment of teeth, I have found this method reliable.—JACOB L. WILLIAMS.

THE

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ORIGINAL COMMUNICATIONS.

SEPARATION AS A PREVENTIVE OF DECAY.

BY ROBERT ARTHUR, M.D., D.D.S.

(Lecture before the New York Odontological Society, April 15, 1879.)

I FEEL highly honored, gentlemen, by your invitation to address you this evening. Circumstances have prevented me from accepting several similar invitations from this society during the past three years. My failure to do so is certainly not attributable to any lack of inclination, for I greatly regret that I am deprived of the privilege of meeting with you regularly, and of taking part in the discussions of the many interesting professional topics to which from time to time your attention is attracted.

I am present this evening again to direct attention, by your request, to a subject about which a great deal has been said, but which merits much greater attention than it has ever received. It has been stated in the notices of your present meeting that I would read a paper on "The Prevention of Decay of the Teeth;" but this is not my intention. I have no paper to read. I have been at a loss, as I have stated to the chairman of your executive committee, to know how to address you on the subject in question. As stated to him and to others, I have already said all I have to say, and must, to a great extent, repeat myself in what I shall undertake to say this evening. But several of my friends who are members of this association have said to me that wide differences of opinion exist as to my meaning, as stated in the small work upon this subject published in 1871, as to the exact nature of the proposed management of the teeth with reference to caries, and the manner in which it should be carried out in practice; that, in attempts which they and others have made to do exactly what it had been understood I had advised, they had met with unfavorable results instead of reaping the advantages I had promised. I was greatly surprised at this statement from gentlemen of their acknowledged intelligence, for I was strongly under the impression that I had, at least, clearly stated my views. But as I appear to have been mistaken in this respect, and as I consider the subject one of great importance, I have thought it advisable to accept your invitation, and to go over the whole matter in your presence in order that I may make any required explanations, and hear, and if possible meet, any objections which may be made. I strongly desire to be fully understood, and will esteem it a favor if any one present will call my attention to anything obscure or unsatisfactory in what I may say.

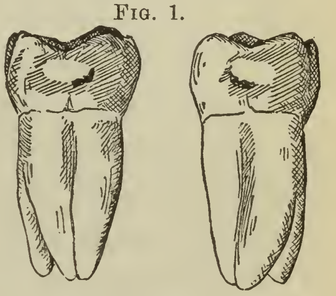
The arrest of superficial caries of the proximate surfaces of the teeth by its simple excision and the isolation of its parts so treated is, as you are aware, an old practice. I have never made any claim to originality in this respect. The very earliest instruction in dentistry which I received had reference to this subject. Dr. H. H. Hayden, of Baltimore, was one of my teachers, and he had extensively practiced this method of arresting caries of the incisor teeth. He was eminently successful in accomplishing the object he had in view, and I have met with cases from his hands showing the best results of this kind of practice, to which he had given attention many years ago. His treatment in this respect, however, was, so far as my acquaintance with it extends, confined to the incisor teeth.

Dr. Chapin A. Harris, too, as will be found by reference to the earliest editions of his works, was decidedly in favor of this method of treating superficial caries. In one of the earlier numbers of the *American Journal of Dental Science* will be found an article by his brother, Dr. John Harris, very strongly advocating the advantages of the practice. I have merely proposed to extend the treatment further than he or others have done, and to commence at an earlier period.

In order to make my explanations clear, I will call attention to some of the prominent features of dental caries. This subject has received, as you are aware, a great deal of attention, and although, as Wedl has suggested, we have no strictly scientific basis upon which to construct an entirely satisfactory theory of caries, yet we know a great deal about it which is perfectly clear, and which renders the practice based upon this knowledge entirely rational. There will be no dispute about the correctness of the statement that caries always attacks the external surfaces of the teeth. There is no such thing as internal caries. It will be admitted, too, that dental caries is characterized by a chemical decomposition of the tissues affected. It will not be disputed that the agent which effects the decomposition appears to be acid; that it is commonly of feeble power, and that in order to decompose the substance of the teeth its retention for a considerable length of time in contact with certain parts of them is essential. You are all, of course, aware that caries attacks defective places upon the grinding surfaces as a consequence of the retention of substances capable of undergoing decomposition. The remedy for caries of this character needs no consideration before this audience.

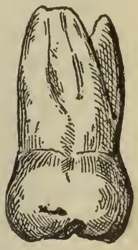
Caries occurs not only at defective parts, but also at places where the teeth are covered with sound enamel. It has been frequently stated that caries of the proximate surfaces of the teeth occurs exactly at the points of contact with adjacent teeth. This, as a general rule, is a mistake. The diagram (Fig. 1) to which I now call your attention exhibits a very common condition of the surfaces of teeth in contact, a few years after they have taken their places in the maxilla. It represents the distal and mesial surfaces of two lower first and second molars. Such specimens may be found in any considerable number of extracted teeth. It will be seen that distinct facets are worn upon the parts which were originally the most prominent portions of these two surfaces. These facets are the result of the attrition of the surfaces caused by the slight movements of the teeth during the act of mastication, or from other sources of motion to which they are subject. Caries rarely occurs exactly at the positions at which the facets are formed. When it does take place, it is probably due to particles of food forced between these worn surfaces.

FIG. 1.



You will, of course, understand that, in by far the greater number of cases, caries so soon attacks the proximate surfaces of fully formed teeth that no such change as that represented in Fig. 1 can occur. The prominent portions are destroyed by caries extending from the original seat of the attack, before the facets are formed. But an examination of a number of extracted teeth from subjects of any age will show that caries of the proximate surfaces occurs *near* the most prominent parts. The diagram (Fig. 2) to which I now call your attention will render my meaning intelligible. It will be seen that in this specimen, which is from a drawing of an upper molar, the attack of caries has taken place below the most prominent portion of the surface represented. This accords with the appearance observed in a very large number of extracted teeth, and the observation can be

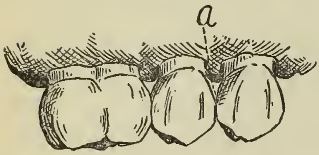
FIG. 2.



verified by any one who chooses to make such an examination. It may, however, attack any part above, below, or on the sides of the most prominent portions of the adjacent surfaces.

By reference to the diagram (Fig. 3) representing a first molar and first and second bicuspid of the upper jaw, it will be seen that above the points of contact a somewhat triangular interval results from the relative positions of the adjacent teeth and the lower border of the alveolar process. (I am, of course, calling your attention now to matters with which you are entirely familiar, for the purpose of making all points of my explanation clear.) This space is filled during life by the gum. Its boundaries, formed principally by the necks of the adjacent teeth, are protected by the gum from the contact of decomposing agents.

FIG. 3.



It is in the interstices described that, as a rule, the attack of proximate caries commences. I do not assume this, but any one of you can easily verify my statement by the examination of extracted teeth of the classes to which I have referred. Immediately below this triangular space, and forming a part of it, indeed, the interval between the two teeth shown in diagram, Fig. 3, *a*, becomes very narrow.

There is another point to which I wish here to direct your attention. It is this: that in proportion to the extent of contact of adjacent surfaces will be the liability to an attack of caries,—not at the portions of the surfaces in actual contact, but in the interstices near them, as explained. This is due to the difficulty of the removal of substances finding their way into these interstices. Observation shows that while at the exact point of actual contact caries rarely occurs, at the narrow interstices near the prominent points caries occurs in proportion to the extent of contact of the adjacent surfaces.

Now, the obvious remedy for this unfavorable condition is to lessen the area of contact.

This fact has long been recognized, and the enlargement of these spaces has been long practiced, after the attack of caries has commenced, and is what is meant by and what is the object of permanent separation. If this separation can be made so as to render the distance between the surfaces so great as to be self-cleansing, and at the same time permanent, the object in view will be accomplished.

The necessity of the free separation of the teeth as a preparation for filling proximate surfaces has always been recognized by some of the best practitioners of the present day, and this practice, instead of being abandoned, is, according to the best testimony accessible, looked upon with increasing favor. Dr. Geo. H. Cushing, in his report upon

Operative Dentistry to the American Dental Association, at a recent meeting, states in general terms that he had ascertained that the practice of permanently separating the teeth had increased. It is true that he stated in this connection that it was not in accordance with Arthur's plan. It is of no consequence whether he is correct or not in this respect, but his statement is important testimony in favor of the fact that this practice has recently gained ground.

In the work referred to—and you must pardon my frequent reference to what appears personal, as it cannot be avoided—I have described a method of separating the teeth for the accomplishment of the object in view. It is this which it is alleged has been misunderstood. The directions I thought were very plain. I certainly expended a great deal of thought and labor to make them so. A reference to the work in question will show that I advised wedge-shaped separations, and the illustration on page 137 will show that the apex of this wedge was at the gum, and in the upper jaw was just at the lower part of the triangular space, which it embraced by a very slight separation. If any point is made plain, I am sure that it is this. These separations were of such shape as was supposed to be best suited to admit of self-cleansing.

Now, it has been alleged that one of the results of separating the teeth in this manner is that in mastication tough or hard fragments of food were forced down upon the gum, producing great irritation, and rendering this important act very painful. It will be found that the leading idea of the work referred to is the arrest of caries of the proximate surfaces by very early treatment, or its prevention by separation when it was considered advisable before the actual presence of caries could be detected. If the treatment advised were confined to such cases, and the separations made in strict accordance with my explicit directions, no such unfavorable result could occur, as the part of the separation which opened the triangular space I strongly urged should be made so narrow as to render such a result impossible. This has followed separations too widely made, or attempted after the caries had progressed so far as to render the treatment improper. I have made separations of this kind in many thousands of instances, and such a result (of extremely rare occurrence) was always attributable to precisely the causes stated. Gentlemen have stated to me that they were afraid to attempt the treatment I had advised as a preventive measure, and seemed to be afraid to resort to it in any case sufficiently early to reap its advantages; delaying it, indeed, until resulting trouble of the nature described was inevitable. Now you must excuse me if I decline to be held responsible for such results. If my explicit directions are disregarded, and operations performed not advised by me, the operator who finds himself involved in difficulty must not attempt to shift his responsibility to my shoulders.

I have considered it desirable to say this much with regard to the subject in a general way, but I propose to be still more explicit. In order to avoid any further possibility of misunderstanding, I will follow out so far as I have time to do so the treatment of the case of an individual as I would and as I do pursue it in my own practice. At every step of this description I am open to inquiry from any one present. Questioning will not in the slightest degree interfere with what I have to say; on the contrary, it is what I strongly desire.

The first permanent teeth we have to deal with are the molars which make their appearance at about the age of six years. That I do not approve of the wholesale sacrifice of these valuable teeth I have strongly stated on all proper occasions. As you are aware, the first permanent molar tooth takes its place in close contact with the second temporary molar if that tooth is remaining.

There is one point which I wish to make here. It is of the very first importance. It is indeed the key-note to the management of the teeth by any method. In the consideration of the means of preserving the teeth they are considered as in a more or less carious condition. The best manner of meeting and remedying this condition is what makes up the burden of discussions in dental associations. But it should be borne in mind that when the teeth first make their appearance, and take their places in the jaws, *they are sound teeth.* When you have unrestricted professional care of a child, it is most important to regard their teeth as in this condition, and to resort to all possible means of protecting them from the influences which produce caries. When you reflect about the matter, does it not seem strange that a dentist who has the charge of a child should remain supinely inactive while the disease which it is his province to combat is rapidly consuming the teeth he is trusted to preserve? It would be as rational to allow an affection of a limb, which could be arrested by simple means, to go on until the limb might probably require amputation.

The first step to be taken in carrying out this system is to separate the second temporary from the first permanent molar,—the first of the second set which requires attention. This must be done in such a manner as to prevent subsequent contact with the permanent molar. If this is done, the latter tooth remains secure from an attack at a position where it is most difficult to arrest, especially at the early age when the operation of filling becomes necessary. This treatment is so simple, and so free from the possibility of unpleasant or injurious consequences, that no objection worthy of notice can be urged against it. In a discussion, the report of which I have met lately, it was strongly urged that it was advisable to extract these teeth, as a general rule of practice, because, among other reasons, they were more liable to be attacked by caries than the other teeth, and consequently more difficult to preserve. I am unwilling to admit this, although a very common condition of the mouth at the time this tooth makes its appearance, and for some years after, renders all the teeth more liable to decay than after carious temporary teeth are got rid of. The first molars are no more difficult to preserve than any other teeth. But even if the preservation of these teeth permanently should not be considered important, it is admitted that their extraction before eleven or twelve years of age would be injurious. Unless the proper means of preserving them are resorted to soon after they make their appearance, they will be destroyed long before the time named. But I cannot dwell longer upon this part of my subject.

The incisor teeth must now engage our attention. It is not necessary to make any attempt to prove the value and importance of these teeth. No one, I believe, advocates their extraction, except when it is unavoidable. Fortunately, the preservation of these teeth, even when the tendency to caries is very great, is comparatively easy. I have no hesitation in repeating here what I have often before strongly stated, that the incisor teeth may, with rare exceptions, be saved, even after they are attacked by caries, without filling them, and without the slightest disfiguration.

This may seem a broad and strong assertion, but if the statement I make is correct it will be admitted that it is a matter of great importance. Who can reflect upon the frequent cases of disfiguration of the incisor teeth of ladies without a feeling of sorrow, which is certainly not lessened by the knowledge that, aside from the neglect of the person interested, it is entirely unnecessary? I have been greatly surprised that a method of treatment of the simplest character, and which I have pursued for more than thirty years, should be comparatively unknown. It is so familiar to me and its advantages are so obvious, that it has seemed to me that I was making trite statements when I have said anything about it. And yet a member of this society, a gentleman of recognized ability and intelligence, than whom I know no more progressive and conscientious professional man, a short time since asked me, with an air of incredulity, whether I had ever made such a statement.

I here offer for your inspection a model of the upper teeth of a lady who was about thirteen years of age in 1863. At that time her incisor teeth were separated as is shown. One of the teeth has subsequently been filled, but the rest remain free from any appearance of caries. The model was made from an impression taken a short time before I left home. These teeth have not been touched in the way of operations since 1864. Why should not a similar result be looked for generally? There were certainly no favorable conditions in this case, as the teeth were of very frail and delicate character. I may mention in this connection a family of seven children, with remarkably frail teeth, who have been subjected to this treatment, and, although all have reached adult age, their incisor teeth are not filled in six places. But this is a common result.

As I have stated, such results can be obtained with a great degree of certainty and with no disfiguration. In some of Dr. Hayden's cases, while they had been successful in arresting the attack of caries, the teeth treated were much disfigured. It is more than probable that this feature of earlier operations tended to bring the practice of separating or "filing" the incisor teeth into disrepute. In every edition of Dr. Harris's work a ghastly figure is displayed as a model for the separation of the teeth. It appears to have been drawn from a set of artificial teeth of not the most artistic construction. It exhibits, however, the form of separation made when I first entered the dental profession. It will be seen on examination that a flat separating file had been carried up between the teeth until it approached the gum, leaving square shoulders. Such operations are inadmissible when carried to this extent, because they produce disfiguration. Separations of the incisor teeth, if made sufficiently early, will effectually arrest the attacks of caries, but it is unnecessary to make them so wide, and the shoulders may easily be beveled, as shown in the diagram. (Figs. 4 and 5, *a*.) This form of separation for the removal of superficial caries of the incisor teeth is a good one if kept within proper limits. It is one, however, which I have followed to but a very limited extent.

Fig. 4.

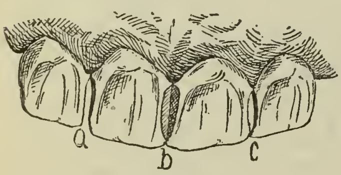
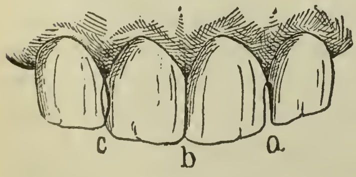


Fig. 5.



As a general rule I have been in the habit of separating the incisor teeth by cutting them away from the junction of the lingual and proximate surfaces, as shown in the diagram. (Fig. 4, *b*.) The separation is not carried through. Looking at the front of the teeth separated (Fig. 5, *b*), there is no separation visible. The only portions of these teeth left in contact are those forming the external line of the enamel. The cutting away from the back parts should be very free; if this is done, without going to excess, the parts treated can be kept thoroughly cleansed by the ordinary use of the brush. I have found such separations effective in arresting superficial caries.

I here exhibit several models of cases treated in the manner described. This one is the case of a young lady for whom the treatment was commenced in 1865, at which time the separations of the incisor teeth were made. Two members of this society now present came to Baltimore in 1872, in order to ascertain for themselves, by an inspection of such cases as I might be able to show them, the results of treatment I had described and advised. The patient of whose teeth I exhibit the model (which was made a few weeks since) was the one seen by these gentlemen. The incisor teeth of this patient have required no attention since the time of the visit referred to. There is nothing remarkable about this case; it is but one of many that any one could exhibit after the same number of years of similar practice.

Another method of separation is sometimes advisable, as shown in the diagram (Figs. 4 and 5, *c*). This consists in permitting the teeth to touch slightly at the lower part, or in some cases, depending upon the shape of the teeth under treatment, in cutting away the rest of the proximate surfaces in a crescent form. I have never found any difficulty in arresting superficial caries of the incisor teeth by treating them by one of the methods described.

Dr. S. G. Perry, New York. At about what age are the separations made?

Dr. Arthur. It depends upon the predisposition of the teeth to an attack of caries. I never make separations of the incisor teeth so long as they are sound, but invariably examine them carefully at short intervals after they are fully formed. As they can very easily be pressed apart, the examination may be thoroughly made without difficulty. It must be understood that the most efficient treatment of caries of these teeth depends upon its early discovery. When there is only a slight softening of the surface of the enamel, caries may take place without discoloration. At this stage of the attack the decomposed portion may be polished away with pulverized pumice-stone, carried upon a piece of tape and passed briskly over the affected surfaces. If the patient can be induced to exercise sufficient care, this simple treatment may effect the arrest of the attack, although I must confess that I have but little confidence in such a result. May I ask if there is anything still necessary to explain with regard to this portion of my subject? I am here to-night for the purpose of making myself clearly understood. I will take it as a favor if any gentleman will ask for any further explanation if it is desired.

Dr. Perry. Do I understand that you space, by wedging apart before separating, for convenience' sake?

Dr. Arthur. Yes, sir; I do that because it allows more room for any necessary operation, and because the surfaces can be seen more plainly.

Dr. L. D. Shepard, Boston. May I ask if this statement is not a little different from that you made in your second edition?

Dr. Arthur. Perhaps it is. I think I made very slight reference to the incisor teeth. I merely made a suggestion relating to the first mode of separation just noticed, and referred to what had been said of this class of teeth in a former part of the work.

Dr. Shepard. As I remember it, when you find decay in the sixth-year molar, you separate the incisor teeth before decay begins?

Dr. Arthur. I am sure you are mistaken about that, because I never made any statement of that kind.

Dr. W. H. Dwinelle, New York. Will you be so good as to reiterate the statement in reference to separating the teeth? I think I understood you that you never separated the teeth with instruments for the purpose of polishing out between the proximate surfaces, unless you were satisfied that softening had commenced. I speak with regard to the incisor teeth.

Dr. Arthur. With regard to the incisor teeth, yes, sir. That is as far as we have got. It gives me pleasure to reply to any questions that are asked. I hope there will be no misunderstanding about the matter, for whether the views I hold with regard to it are regarded as correct or erroneous, I wish to be understood.

Dr. Dwinelle. You name the point of decay to be at the cervical portion of the teeth or at the point, according to circumstances as they may present themselves?

Dr. Arthur. As a general rule, if I find a patient who is careless with the teeth, and I cannot depend upon ordinary cleanliness, such a separation as shown in Figs. 4 and 5, *a* and *c*, may be preferred. But when a patient is ordinarily careful the separation shown in the diagrams, Figs. 4 and 5, *b*, generally answers the desired purpose. I think it an important point in attempting any operations on the teeth to place them, so far as it is possible, beyond the necessity of great personal attention. That should not be an element in the matter, so far as it can be avoided. I do not mean to say that ordinary attention should not be given to the teeth, but I mean that the result should not be made to depend on extraordinary attention. The method of separating them is simple. If I find that caries has occurred, I prefer to press the teeth apart, so that I may get fairly at the surfaces, and when that is done it is easy to make the required separation with an ordinary chisel. If that does not effect it to your satisfaction, there is a very simple device to which I have resorted, and that is to make an instrument similar to No. 243 of S. S. White's catalogue, of shellac and corundum. It can be easily made. I simply use an ordinary mandrel, and heat it to a point at which it will melt shellac. A mixture of corundum and shellac is heated on a metal plate until it and the shellac attached to the mandrel will unite; then it is rolled under the fingers into the desired form on the table. It would be better to knead corundum with vulcanizable rubber softened by heat, and afterwards vulcanize it. A very useful instrument of this kind can be made in this way. This little instrument will afford very great aid in the operation referred to, or in making any other surface smooth; and after that is done the surface should be polished smoothly with pumice-stone and afterwards with oxide of tin.

Dr. Hawes. What is the method of separating the teeth previous to examination?

Dr. Arthur. I have been in the habit, for the past twenty years, of using ordinary tape. I never use rubber for the purpose. I have no question that a very thin slip of rubber could be used with advantage; but as in the ordinary way, if a thick piece of rubber is stretched so as to be thin enough to get between the teeth, and then allowed to recover its form, the effects are very unpleasant as you know. The teeth become exceedingly tender to pressure, and it is necessary to delay any operation until this tenderness subsides. I speak of this incidentally, and I may refer to the case of a young lady once under my care, whose central incisor teeth were slightly carious, but required filling, and were several years afterward separated with rubber by another dentist. The separation not only caused great pain, but destroyed the vitality of the pulps of one central and one lateral incisor. It was, of course, injudiciously used in this case. I see no necessity for using rubber for this purpose, as tape will effect the object very quickly. This is a very simple and effective method. If it is not entirely familiar to you all, I may describe the process: A piece of ordinary tape is forced between the teeth to be separated. In the course of an hour or two the teeth will be separated very slightly; then double, and afterwards treble the tape in thickness, and allow it to remain until the desired separation is made.

Dr. J. W. Clowes, New York. Linen or cotton tape?

Dr. Arthur. Either; it is immaterial. Let us now pass from the incisor to the bicuspid teeth.

Dr. Perry. I understand you are taking the teeth of this imaginary child as they appear?

Dr. Arthur. Yes, sir. I am sure that no one will undertake to oppose the statement that the bicuspid teeth are more difficult to preserve, in a shorter time after they are attacked by caries, than any others of the permanent set. As a general rule they are more frequently lost or hopelessly disfigured, under ordinary imperfect or careless treatment, than the incisor or molar teeth, and for reasons which I am sure it is unnecessary to state to any one in this audience. It must be admitted, too, that they are quite as subject to caries as any of the rest of the teeth, and that, as a consequence of their usual shape, their decomposition may go on for a considerable time before any external signs of the presence of caries become apparent.

Dr. Perry. Very often with young children these teeth come not in the position we hope they will occupy when the child is older, but pressing upon each other irregularly, sometimes lapping over; when the cut surfaces will not remain the same as when made.

Dr. Arthur. I do not know any other plan than to separate in the best manner possible when caries has actually occurred, then examine frequently, and as the teeth change their positions do what may become necessary. I do not know how else to answer your inquiry.

It becomes a matter of great importance, in view of the difficulty of preserving the bicuspid teeth, that the kind of attention I propose should be given to them at the earliest moment they are discovered to be carious, or in some cases before caries takes place. The same may be said, indeed, of any of the teeth; but as the question is one of special importance with regard to the bicuspid teeth, we may consider at this place the admissibility of separating sound teeth as a preventive measure. The greatest objection, probably, to anything I have said on this subject is to the advice I have given upon this point. Certain operators do not object to the treatment of superficial caries by separating them, but the idea of cutting apart sound teeth in anticipation of an attack of caries seems to appal them. Let us, then, examine this feature of the proposed treatment carefully.

I would ask at the outset, how many children among the better classes of people, those who resort to preservative dental operations, escape caries of the proximate surfaces of all the teeth except the lower incisors? I have taken some pains to make this inquiry of a number of gentlemen of experience in practice and careful observers, and the uniform reply has been that very few individuals escape caries at the places referred to, sooner or later, and generally before adult age. My own experience in practice confirms this statement. I do not think the exemptions will amount to five per cent.; or as an extreme limit, not to more than ten per cent. If this is true, it is a fact which has a very important bearing upon this question.

It cannot be disputed that the close proximity of certain parts of adjacent teeth constitutes a predisposition to dental caries. If nothing is done under such circumstances to avert an attack of caries of these surfaces, the removal of a carious part after the attack has commenced, but before it has penetrated into the dentine, and the permanent enlargement of the interstices in the manner I shall presently describe, will, in most cases, effectually arrest the progress of the disorder. I think it will not be disputed that such portions of two surfaces, treated in this manner, as are perfectly isolated and in such condition as to free themselves, as a result of ordinary attention, from accumulations of foreign matter, will not be subject to any further attack. It is still possible that caries may occur in the vicinity of the parts near the gum necessarily left in contact. But as the parts in contact are reduced to very small dimensions, this liability is very much reduced. Extended observation has established the fact that caries rarely attacks this portion when the separations are made soon enough. But, even if it should occur, it can readily be detected by means of an examination easily within the reach of any operator, and the other remedy can be easily resorted to. This treatment will not, therefore, in any manner interfere with the final resort to filling, or impair the efficacy of this operation. On the contrary, it will insure these surfaces against an insidious attack of caries which may progress so far before it is discovered as to render the operation of filling more difficult and the result more uncertain.

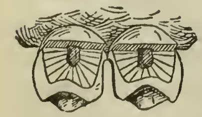
I have given close attention to all objections which have been offered to this method of the treatment of superficial caries of the proximate surfaces. I do not hesitate to repeat what I have said heretofore, that they have no force, and until some better reasons are offered against the practice, I have the right to assume that the treatment is all that is claimed for it.

Now, as I have urged and as is obvious, the success of this treatment for the arrest of caries is in exact proportion to its early application. If, then, it will effect the arrest of caries by the removal of the conditions upon which it depends, why should not the same treatment prevent its occurrence? The proposition is so simple that it proves itself. The only valid ground of objection to the separation of the teeth for the prevention of caries is the one that has been urged, —that teeth may be separated which, if left alone, would never be attacked by caries. But if ninety per cent. of the teeth in question are likely to be attacked by caries, the risk in regard to the teeth which would remain sound is small. But it may be denied that so large a proportion of teeth will be attacked by caries. I must admit that there are no exact data upon which such a conclusion can rest; so far, at least, as definite numbers can be determined. But from long and careful observation, and from comparison of views with others who have had long experience in the practice of dentistry, I am quite confident that the estimate is not far out of the way.

But, admitting that indiscriminate separation of the teeth of all children is inadmissible,—and this is a course I have never brought myself to pursue or advise,—there are certain signs of general conditions which will enable any dentist of experience to forecast the future of the teeth as regards caries with a degree of certainty which will render a mistake so nearly impossible that it need not be taken as an element. Very trustworthy data may be derived from a consideration of the character of the teeth, the condition of the buccal fluid, the general health, hereditary predisposition, and the tendency to caries as it exhibits itself as the permanent teeth make their appearance. Other indications of a predisposition to caries might be offered if time permitted, but the simple rule which I have already offered furnishes a very trustworthy guide. If the proximate surfaces of the incisor teeth are attacked by caries before the twelfth year, it may safely be concluded that none of the teeth except the lower incisors will escape from caries at the same portions.

Now, I beg to say that the reasons I have here urged have satisfied me of the importance of such preventive treatment as I now propose. I will leave out of the question the probability of the existence of caries before the separations are made, although it generally attacks these parts as soon as they are formed. But I will assume that the bicuspid teeth, the treatment of which I now propose to describe, are sound, but they are the teeth of a patient in whom all the signs of the predisposition to caries are so decided as to satisfy me that they will not escape an attack. I decline to wait until the teeth are partially destroyed by caries before I proceed to give them attention. I propose to keep these sound teeth free from its attack. I shall separate them. But by separation I do not mean to cut them apart in such a manner that the mastication of every tough piece of beef will produce suffering. I have never advised such separations. A division between two of these teeth, even as I have formerly advised it, did not lead to such a result; but, as I shall presently show, it did not furnish sufficient security against an attack of caries; and as I at present propose to separate them the division is so slight as to be unobjectionable. The form of separation which I now propose, and which I have practiced with great advantage for five years past, is shown by the diagram (Fig. 6). It represents, as you perceive, two adjacent bicuspid teeth, with such a separation as I would advise to be made as a measure of prevention or for the arrest of caries before it has advanced beyond the stage when such treatment can be applied. It will be seen that it is carried very nearly, but not quite, up to the gum, as nearly as possible leaving a shoulder sufficiently strong

Fig. 6.



to bear all the force to which it may be subjected without entering the triangular space. The diagram is larger than the natural size of the teeth, and the separation is represented somewhat larger than is required.

Taking the explanation I have made of the positions at which caries first makes its appearance, it is at once seen that all the narrow interstices are removed except one at the lower part of the triangular space. But this space is protected from the intrusion of foreign substances by the shoulder below it, and, as it offers so slight an obstacle to the passage of fluids, even the mucous secretion is not likely to remain for any length of time in that position. It must be admitted that this operation very greatly reduces the liability of two such teeth to an attack of caries, if it does not with certainty place them in such condition as to be entirely exempt from it. If it should fail to accomplish this object, what forcible objection can be made to such treatment in comparison with the course commonly pursued? The normal condition of the teeth is but slightly changed by such a separation. The gum cannot be injured, as it is not exposed. The separated surfaces cannot become sensitive, as the enamel is not removed. If the only possible bad result follows this treatment, the recurrence of caries, it is detected, as I have so often urged, upon its first appearance, and can be arrested by fillings of very simple character. Even if this attempt were not made to prevent the attack of caries, and no attention were paid to them until the last resort, filling, could not be avoided, the separation made is merely a part of what must be done, and at a great comparative disadvantage, in order to effect this operation in the best manner.

But the form of separation just described is not such as I have advised in the first edition of the work referred to. That was a wedge-shaped separation, with a very slight opening into the triangular space. Now that I advise a change in the separation implies an admission that it was not satisfactory. I have no hesitation in admitting that I met with a very important difficulty, and that was the more frequent recurrence of caries than I desired to encounter. I watched with great care every case treated, and came to precisely the same conclusion at least five years ago that other gentlemen have since reached. Reflection upon the causes of the recurrence of caries when wedge-shaped separations were made—*i.e.*, the retention of extraneous substances at the interstices represented by the narrow portion of the wedge—led to the change of the form of separation just described. But, while I make this admission, I by no means admit that even with this defect the practice advised, when carried out in strict accordance with my directions, was not a great advance upon the common method of permitting caries of the teeth to go on until large fillings became necessary. I contend now, as I have always done, that, if caries recurred after every separation made, the practice would be vastly better than that to which I refer. I am in no degree dissatisfied with the results of this treatment. The model I now exhibit is fair evidence of these results. The impression from which this model was made was taken a few weeks ago. The treatment of this case was commenced in 1862. The patient was then eight years of age, and the method of treatment I have urged was employed. There was fully the usual tendency to caries, which always made its appearance on the proximate surfaces soon after the teeth took their normal places. All the incisor teeth were separated by the method shown in the diagram (Fig. 4, *b*); they have not required any attention from me since that time, and remain entirely free from caries. All the rest of the upper teeth, as you will observe, are separated in accordance with the plan described in the first edition of my treatise on the subject. The same is the case with the lower teeth, except the incisors, which remained untouched by caries. The teeth all remain. There has been no exposure of a pulp in a single instance. No inconvenience or trouble of any kind has been experienced. No separations in this case were made until the actual presence of caries was ascertained. I find, on a careful examination of the record of this case, that caries has recurred where the separations were made in twelve instances, but was arrested without difficulty, with small fillings. This is but one of many cases I could bring before you in detail, but this is a fair illustration of most of them. In this and similar cases there was no question about contour fillings, for none were required. When such treatment is carefully carried out, the relative advantages of capping the pulp or extirpating it lose interest, for neither ever becomes necessary. As to the advantages of this system, even as first proposed by me, I have no question; as to these advantages with the improvements offered, I defy controversy.

Dr. A. H. Brockway, Brooklyn. Should the separations be such as to leave the walls parallel?

Dr. Arthur. That is not important. They may, perhaps, with advantage, be larger toward the lingual than buccal surfaces. Dr. Perry informs me that this has been his practice for some time.

I have occupied a great deal of your time this evening, gentlemen, and yet I have said but little of what might be said upon this subject. I am compelled to end my description of the treatment of an imaginary case before completing it. There is, of course, much more to be said in detail about the treatment of the molar teeth, but in general it is the same as that which I have described as applicable to the bicuspid teeth. The subject, it must be admitted, is an important one, and, if rightly considered, with great capabilities for good. It is one with claims which, as progressive members of the dental profession, commend it to your most careful attention. No one of you can justly consider his own interests exclusive of those who intrust themselves and their children to your professional care. This duty imposes upon us the obligation of informing ourselves fully with regard to the value of any suggestions which tend to increase our ability to render in the best possible manner the service required of us. Conservative dentistry does not, taking into view the general practice at the present day, fully perform its function. Suffering and injury, which ought to be avoided, we find to be common from the consequences of dental caries. While no one acquainted with the condition of dentistry in this country, advanced as it is in certain respects, can deny to the best men the ability to preserve the teeth in nearly every case under their control; this ability is, however, confined to a comparatively small number of men. But even if we grant that all who practice dentistry are capable of performing this service, the present methods involve an expenditure which absolutely debars all but a small part of the community from the benefits of dentistry. Any method which will simplify the attention required to combat dental caries effectually deserves the attention of every man who regards the general welfare as a motive of action. It is in this view of the subject that I commend the remarks I have made to you this evening, with sincere regret that they have not been more forcible.*

OPERATIVE DENTISTRY.†

BY MARSHALL H. WEBB, D.D.S., LANCASTER, PA.

Operative dentistry includes within its range the application of remedial agents for the correction of perverted function and the removal of abnormal growths, so that the physiological energies may be free to normally reproduce and maintain the elements of the tissues and organs; the observance of dentition throughout its course, that irregularity of the teeth may be averted, modified, or corrected, and the performance of such operations as shall prevent or arrest disintegration or caries.

The deciduous teeth should be kept in place till displaced by the advancing permanent ones, but it is sometimes necessary to remove disintegrated tissue and fill cavities in them that they may be preserved. These deciduous organs should be extracted when devitalization of the pulp occurs, and particularly when abscess has appeared, for the reason that solution and absorption of the tissues of the roots of these teeth (as the permanent advance and press upon them) does not normally take place after the death of the pulp, and such absorption is necessary that malposition of the permanent teeth may be prevented.

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* The discussion of this lecture will be found in the report of the New York Odontological Society in this number.

† A portion of this paper was read before the American Dental Association at the session of 1878. In its present form it is largely modified, and much new matter has been added.—M. H. W.

Very soon after the eruption of the first permanent molars, and while the deciduous are being displaced by the permanent teeth (and for years after the eruption of the latter), examinations should be made frequently, not only for the purpose of averting irregularity of the organs, but for ascertaining whether disintegration has commenced upon the proximate surfaces of any of the teeth, or in the fissures of the bicuspids and molars.

The first permanent molar should never be extracted after the second has been fully erupted, except to correct an irregularity. If the first be extracted after the eruption of the second permanent molars, these teeth (especially the two lower ones) may incline or tilt forward and the bicuspids backward, thus causing imperfect mastication. If irregularity of the teeth take place after the twelfth year, the second bicuspid (sometimes the first), rather than the first permanent molar (unless it be a pulpless one), ought to be extracted.

Disintegration upon proximate surfaces can be prevented by occasionally polishing such surfaces, and having the patient pass floss-silk between the teeth daily. This will not require as much attention on the part of the operator and patient as where the so-called permanent separations have been made.

When disintegration has commenced at or near the part of one tooth that is in contact with another, and after the teeth have been separated by pressure, so that needless cutting of enamel may be avoided, the superficial decalcified basis-substance of the enamel should be removed (after the rubber dam has been applied) by the use of fine, sharp files, and strips cut from emery-cloth or paper, of the finer grades, such as No. ½ and No. 0. If, after the removal of the decalcified portion from the periphery of the enamel columns or rods, the whole surface presents the appearance of normal tissue, this surface should be carefully polished with pulverized pumice, applied upon linen tape or a soft rubber disk. If there remains a portion of enamel of a lighter or other shade than that which surrounds it, all the disintegration has not been removed, and it may extend to the dentine, thus necessitating the cutting out of all the disintegrated tissue and the thorough preparation and careful filling of the cavity presented.

Permanent separations ought not to be made, because they interfere with mastication, annoy the patient, and, with few exceptions, do not prevent disintegration upon or about the surfaces that have been cut. Food wedges at the part where the teeth again come in contact (which they almost invariably do excepting where antagonists prevent them); this food becomes putrescent and disintegration takes place, and that, too, in a part of the tooth where it is difficult to perform a first-class operation. All this may not take place, however, until the tactile corpuscles throughout the gum tissue pressed upon have become so paralyzed that the patient is not notified of the presence of impacted food.

As it is better to use tin, oxychloride of zinc, gutta-percha, or an alloy than to improperly insert gold, so also is it better to cut away a part and endeavor to save what remains of a tooth than to deprive the patient of the organ altogether; but operators ought rather to possess a thorough knowledge of the living matter, and have a higher appreciation of fine and beautiful tissue, than to content themselves with simply being capable of using amalgam, even if they can properly prepare the cavity of decay, insert the material and finish it; or to insert gold and then cut away enamel so as to conform to the filling; or to make permanent separations, and thus mar the beauty and at least partially destroy the usefulness of priceless organs.

When disintegration has advanced along a fissure or in a sulcus or the sulci of a bicuspid or molar tooth, the rubber dam should be neatly applied to the tooth in which such a cavity is found, as well as to the one or more adjoining, so that the parts may be made dry and brought more plainly into view. If decay has made considerable progress beneath, and the opaque carious dentine can be seen through the plate of translucent enamel, the cavity should be opened into by means of enamel-chisels. The softer portions of disintegrated dentine should then be removed by sharp excavators, the fissures sufficiently opened, and anchorage for the filling made by keen burs operated by a dental engine. The walls should be well shaped, with very little undercut; the margins of enamel evenly and smoothly finished with fine, sharp burs; a starting-point made (if one of the fissures does not serve the same purpose), and the whole cavity so prepared that all the gold may be impacted by the aid of the mallet.

It is necessary to apply the rubber dam to obtain desirable results in the class of cases just referred to, and no permanent operation should be performed where decay takes place in the buccal and labial surfaces of the teeth, unless this most valuable of all the aids be properly applied. Such application of the rubber dam can and should be made in all cases, provided the operator has the ability to successfully use it; and although pressure upon the gum is necessary that the rubber dam may be carried to the neck of the tooth to be operated upon, and to each adjoining tooth, yet, when properly applied and ligatures of waxed floss-silk are used, inflammation of the tissue pressed upon will not take place, excepting, perhaps, in rare instances; and in these it will soon pass away. That operations be performed as well as possible, it is necessary that the parts be kept free not only from saliva, by the use of the rubber dam, but also from all moisture; even the vapor contained in the exhalations from the lungs, as well as the touch of a finger, will prevent the cohesion of gold, which cohesion is essential to success in the performance of all, and particularly the higher type of operations. For such operations a half-leaf of light gold foil for small, a whole leaf for medium, and two leaves for large operations, should be taken from the place in the book in which it comes by means of a spatula or the foil-carriers, and placed upon a piece of spunk which has been covered with white kid. The foil should be folded with an ivory spatula into a tape-like form of about four, eight, or ten lines in width, respectively, then taken up in the foil-carriers and cut across into parts about a line wide. As these parts are cut from the ribbon they should fall upon spunk covered with kid, from which they can be readily taken with light-pointed foil-carriers or the packing instrument. Heavy foils (such as No. 30, and sometimes No. 60) may be used to great advantage, especially in extensive restoration of the contour of missing tissue, although light foil, when prepared as just described, can be more easily impacted into small cavities, fissures, and grooves.

Any preparation of gold can be made more uniform in density with greater ease and rapidity by the aid of a properly adjusted electro-magnetic mallet, operated by a full current of electricity and guided intelligently, than by any other known method.

As each piece of properly prepared foil is passed over the flame of alcohol and introduced into the cavity (either by an assistant with light-pointed foil-carriers, or by the operator himself with the packing instrument) and simply attached to the part (one or two pieces) placed by hand in the starting-point, or that already there, the electro-magnetic mallet should be set in operation, and the finely-serrated point of the packing instrument placed (*not pressed*) against and made to operate upon the gold in a manner somewhat similar to that of making dots on paper with a pencil. Light, hard, or graduated blows can be made without changing the adjustments of the instrument, as fine or heavy lines are made on paper with a pen. When the electro-magnetic mallet is operated and guided as here indicated, gold can be carried against and over the margins (even frail edges) of enamel without fracturing them, and without the instrument passing off and puncturing the rubber dam and wounding tissue.

Almost the same blow is required throughout each and every operation, because the gold should be solid and uniform in density; hence the action of the battery ought always to be regular, so far as intensity and constancy are concerned, and the pieces of gold for a given operation should be about the same in size and in degree of cohesiveness, and be uniformly and solidly impacted.

A four-cell Bunsen battery should be used for the electro-magnetic mallet. The fluids for this battery are the bichromate of potash and sulphuric acid solutions. The first is made by dissolving a half-pound of the bichromate of potash in a half-gallon of hot water, and then adding ten fluidounces of sulphuric acid. This is the "electropoion fluid," and is for the porous cups. The other solution—that which is for the outer part of the cell, or around the zinc—consists of ten parts of water to one of sulphuric acid. Two of the four cells should be recharged alternately each week, although the time for recharging them depends somewhat upon the frequency and constancy of the use made of the mallet. The whole battery should be kept clean, and the zincs be well amalgamated; a little mercury should be added to the zincs almost every time the battery is recharged. The fluid in the porous cup, and the solution outside of it, ought to be on a level with the top of the cylindrical portion of the zinc. The parts where cell is connected with cell (carbon to zinc, etc.), and those where the wires connect with the mallet, should be bright and tight, and then the battery will always be in readiness.

All gold should be cohesive, especially when a mallet is used, so that each piece may remain just where it is placed, and also that the filling may always be one and inseparable. If there be no affinity between particles, useful, beautiful, and permanent operations cannot well be performed; neither can such precious cohesive particles "exhibit enduring strength" unless each piece of gold be carefully and perfectly impacted.

The abuse rather than the use of cohesive gold has led to its condemnation by those who have not used or do not manipulate it properly and successfully.

If, in impacting gold, any part or the whole becomes displaced, it ought to be removed at once, otherwise the filling would be imperfect. Gold in the form of cylinders and pellets, and when in a non-cohesive condition, may be used in some so-called simple cases; but when really fine or first-class operations are to be performed, foil ought to be so carefully prepared, introduced, and impacted that the operator can be positive that each piece has been firmly anchored, attached, or has adhered to that already in position, and being certain of this, the filling may be made solid and uniform in density, and the organ operated upon fully restored to usefulness.

When caries takes place in the labial portion of an incisor or cuspid, and buccal surface of a bicuspid or molar tooth, and the cavity extends beneath the margin of the gum (as also in some cavities within proximate surfaces), it is sometimes difficult to apply the rubber dam; but in these cases a ligature of waxed floss-silk should be placed twice around the tooth which is to be operated upon, after it is secured to the adjoining tooth or teeth, and while holding the ends of the ligature in the left hand (and just before tying the last part of the surgeon's knot which is to tighten the ligature), both it and the rubber should be pressed (with a burnisher) above the margin of the cavity so as to bring it into view and secure dryness. In such cases it is often necessary to hold the ligature, together with the rubber dam, above the margin of the gum by means of a broad-pointed excavator, but previous to commencing such an operation it is best to have everything at hand that may be required. A clamp should be used when the rubber dam is to be applied to the lower, and at times to the upper molar teeth. The clamp should be first adjusted to the tooth, and the rubber then stretched over it from the posterior to the anterior part, and be also applied to the adjoining tooth or teeth. After the removal of carious dentine with sharp excavators, the margins of the cavities just referred to should be evenly and smoothly finished, and disintegrated enamel removed by means of fine, sharp burs. In some cases corundum cones and Hindostan stones may be used for this purpose. A slight undercut should be made around the cavity along the boundary-line between the enamel and dentine, and a starting-point be drilled in the dentine just inside the enamel, and this in a direction where there is no liability of the drill getting in too close proximity to pulp-tissue. The first piece of foil should be placed in such starting-point by hand, and after that has been inserted, all the gold ought to be impacted with the mallet. When the cavity is entirely filled, the gold should be trimmed down to conform to, and be full with, the surrounding surface of enamel, by means of sharp chisels and files or fine burs. All this should be done previous to the removal of the rubber dam, after which the gold and surrounding enamel ought to be finely finished with pulverized pumice, applied upon wood, leather, or rubber points or cones.

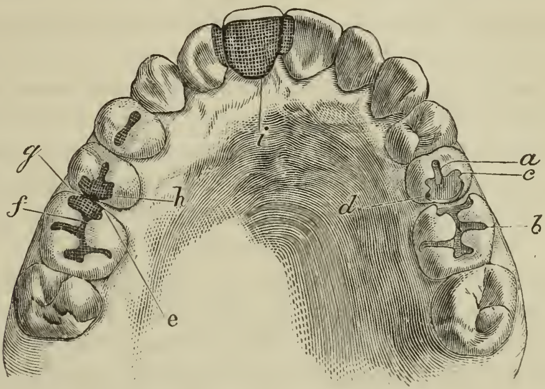
Disintegration upon the proximate surfaces of the teeth commences, almost invariably, just above the part in contact in the upper and just below it in the lower teeth, and when the dentine is involved caries advances beneath the enamel in all directions. When this takes place upon the proximate surfaces of the incisor and cuspid teeth, they should be separated by wedging with wood, or pressing of linen tape or cotton between them. After sufficient space has thus been made, white gutta-percha should be placed in the cavity and between the teeth, and remain a day or two, or till the irritation incited by the wedging has passed away. Rubber ought never to be used for the purpose of separating teeth, because of the irritation which it induces. Quick wedging is frequently necessary, and it is often best to place a wedge of orange-wood between the teeth, even after having pressed them apart, not only to gain more space, but to stay the tendency to approximation, and to make the organs more steady during the performance of the operation, especially if the irritation from the previous wedging has not passed away sufficiently to admit of the insertion of all, or almost all, the gold by the aid of the mallet. When the required space has thus been gained the rubber dam should be applied, the quick wedging resorted to, if found necessary, and the operation commenced. The cavity should be carefully prepared, the edges of enamel smoothly and evenly finished, a groove or undercut made toward the cutting edge and at the cervical wall, and a starting-point drilled in the wall toward the palatal edge; all the anchorage should be made in the dentine, just inside the line of junction of this tissue with the enamel. In the filling of these cavities, particularly the small ones, more than those in any other location, it is necessary to use what is known as "hand-pressure," and pack some of the gold (into undercuts) with small curved instruments having fine and sharp serrations. Cohesive gold can be very successfully used in these cases also, but only when prepared from a half-leaf of light foil, such as No. 4, and so folded as to be equivalent to Nos. 12 or 16, and then cut into strips about a half-line wide. In many cavities of this class, as well as in most others, all the gold can best be impacted by the quick, decided, and even blow given by the short ($\frac{1}{16}$-inch) stroke of the electro-magnetic mallet. The whole operation of inserting the gold should be performed as before indicated, and be so completed that there shall be a perfect restoration of the contour of missing tissue.

After the preparation of such a cavity as those just referred to, particularly the larger ones, and previous to the insertion of the gold, the edge of enamel forming the margin of the cavity should be smoothly and evenly finished, but not rounded, with emery-cloth, first with a narrow strip cut from No. ½, and then one from No. 0. When the gold has been impacted and its surface trimmed down to the edge of the enamel which surrounds it, and the whole made to conform to the contour of the tissue which the gold is to substitute by means of a No. 1 or No. 0 Froid file upon the proximate surface and labial edge, and a fine bur upon the palatal portion, strips of fine emery-cloth should be so manipulated as to perfectly finish the surface of the gold and leave the parts beautifully formed. All this would be done best previous to the removal of the rubber dam, after which the filling should be completed by the use of finely-pulverized pumice, and then silex, each mounted and applied upon fine linen tape. Rouge may be then applied upon a strip of fine chamois-skin. Fine pumice, silex, and rouge leave a finer finish than, but not so bright a luster as, the burnisher, which instrument ought not to be used.

All operations ought to be performed as perfectly and artistically as possible, so that if gold is exposed to view it shall not be repulsive to the sight. The gold should be so impacted against the dentine and enamel that when the operation is completed, and the surface of remaining tissue is made clean, clear, and bright again, the gold tint may be seen through the light walls or edges of the translucent enamel, thus indicating that the filling was perfectly inserted.

When, through disintegration, the enamel of a proximate surface of a bicuspid or molar tooth is penetrated, and the dentine is involved in the disintegrative process, separation by pressure is here, also, necessary. While sufficient space may be gained between the incisor teeth by rapid wedging, yet such wedging of bicuspids and molars cannot be so easily and rapidly accomplished, especially when the cavity extends almost to the margin of cementum; however, in these and other cases the gold should be built into and from the starting-point, along the cervical wall, and to the part where the filling should be made more convex; and when this much of the gold has been impacted and smoothly finished with files, a wedge of orange-wood ought to be inserted between such gold and the tooth adjoining, and sufficient space thus secured to enable the operator to so complete the operation that there shall be no space between the teeth, except at and near the necks. If the operator cannot do this, a wedge of box-wood may be placed from the neck to a part about midway between it and the masticating surface of the tooth, and cut away with burs to the form the filling should have; but such an appliance ought not to be depended upon to retain any portion of the gold. Separation by pressure must be made in some way, else gold cannot be so built out and finished that the teeth may again closely approximate and prevent the wedging of food between them, except, perhaps, in the case of a youthful person, when the space left from the finishing of the fillings by fine files and emery-cloth may again close. Undue and long-continued pressure of the parts upon the capillaries held within the connective tissue which covers the cementum may prevent the return to normal circulation within such vessels after the wedge has been removed; but this result may follow only when proper care has not been taken, or the wedge too rudely or violently applied.

After sufficient space has been gained in the manner described, the rubber dam should be applied to the two teeth separated by pressure, and the tooth adjoining each, that those separated may not approximate during the performance of the operation or operations, and that the organs may be operated upon with greater facility. Except in rare instances a cavity within the proximate wall of a bicuspid or molar tooth should be opened into from the masticating surface (as here illustrated), because, even where but little tissue appears to be



involved in the disintegrative process, this surface would be almost reached upon the perfect removal of the disintegration, and the plate of enamel be liable to fracture if hard substances were to come in contact with it while food is being comminuted. It is far better to cut away the enamel between the cavity and masticating surface than to sacrifice tissue along the entire proximate wall; besides, a better view can thus be obtained, and the whole operation more perfectly performed. In addition to this, the adjoining fissure or sulcus usually requires attention, and should be prepared (as at *a* and *b*, in the illustration) and filled in connection with, and at the time of, the performance of the operation within the proximate wall. Each and every cavity ought to be so prepared that no disintegrated tissue remains (except it be a little discolored dentine just over the pulp for its protection); the margins evenly and smoothly finished with fine, sharp burs, files, and emery-cloth (the edges may be beveled in some cases, but not rounded), and a groove be cut in the dentine along each wall of the cavity (*c*). This groove should not be more than a thirty-second, and rarely but a sixty-fourth, of an inch in depth, and should be made in the dentine just within and near the line of both the buccal and palatal or lingual portions of enamel, and ought to extend from the masticating surface to the cervical wall, along which a groove should not be cut, because of there not being sufficient tissue to make it safe to remove any of it for such a purpose.

Where function has been interrupted and the tissues have not been perfected (as well as in some other cases), the enamel and dentine remaining between and a little above the normal edge of the gum and margin of the cavity (if decay has not advanced to this part) should be cut away with fine burs. Such preparation should be made to about (or a little more than) half a line beyond the margin of the gum, because chemical action takes place at the surface of liquids, and as the surface of the fluids within the oral cavity is usually at about the same line with the gum, disintegration may take place at that part (even though the whole operation shall have been otherwise thoroughly and well performed) unless tissue be removed and the gold properly inserted and finished beyond and about this line. When the gum is in normal condition it so perfectly protects the portion of enamel (and well inserted and finely finished gold) which may be beneath its margin that disintegration, and even discoloration, is prevented.

In deep, or relatively deep, cavities carbolic acid should be applied to the dentine, not only to serve as a disinfectant, but that the protoplasm of the ends of the fibers that are in the dentinal canaliculi and throughout the basis-substance, and also between the enamel columns and surrounding the polyhedral fields of the enamel-rods, may be coagulated and sensation be thus partially obtunded.

In cases where thermal changes may produce more than the usual shock in healthy tissue, after the operation has been performed, oxychloride of zinc should be placed in the bottom of the cavity as a non-conductor of thermal currents in the enamel and dentinal fibers, and in the net-work of living matter throughout the basis-substance.

When a cavity within the proximate wall of a bicuspid or molar tooth has been prepared as described (and shown in the cut), a starting-point (*d*) should be made in the cervical wall, and at that part in the dentine which shall be the safest along the boundary between it and the enamel or cementum. This point, in which to start the filling, should not be deep, yet sufficiently so to retain the small pieces of gold first introduced and impacted while other pieces are being built upon them, and the filling carried along to the groove in each wall,—the buccal and palatal or lingual. The gold ought to be built against every portion of the dentine, impacted as nearly perfect as possible along the enamel and a little beyond its margins, and carried out fully to the line that originally defined the contour of the part (*e*). To thus perform an operation it is necessary to build the gold (or, rather, that part of it nearest the buccal and masticating surfaces) against the proximate surface of the adjoining tooth. By performing this operation with the electro-magnetic mallet, the passing of the packing instrument from off the edge against or over which the gold is being placed may not only be avoided, but the surplus material can be so trimmed away during the performance of the operation that comparatively little trimming is afterwards necessary to make the part restored conform to the original type. Cohesive gold foil, prepared and manipulated as hereinbefore described, can and should be used in the performance of all operations, and should be impacted by the use of the mallet when it is carefully operated, and especially in the cases just referred to, and those where frail edges of enamel are to be supported and protected.

When the foil has been prepared and impacted as described, and so that the substitution for lost tissue is complete, a fine saw or suitable file should be used to cut away the surplus material, and to aid in making the filling conform to the original contour of the part; after which narrow strips (a line or ⅛ inch wide) cut from fine emery-cloth should be so manipulated as to properly form and finish the surface of the gold. When this has been done and the rubber dam removed, the finishing should be completed by the use of fine pumice and silex upon linen tape, as before suggested. The gold at the masticating surface should be finished with fine burs, and, by their use, made concave, or to conform to the original type of the part operated upon (*f*). The gold should be so impacted as to be flush with the prepared margins of enamel, yet, even then, made concave where such concavity is indicated. Fine burs should be used for the purpose of trimming and shaping such fillings, because the form of the remaining part or parts of the cusps and prepared edges of enamel against which the gold is placed may be changed, and the teeth made less useful when corundum cones are used. The polishing of the gold upon the surface referred to may be done with pumice and silex mounted upon suitably-shaped points of wood, leather, or rubber.

Whether a cavity be large or small, the gold ought to be built out to the original contour of the part, and at its periphery, a little beyond the margin, then finished down to the surface of the enamel, and the whole filling made to conform to the line that defined the contour of the lost tissue; contour signifying "the line that bounds, defines, or terminates a figure." This line ought to be restored to that degree commensurate with the extent of destruction of tissue. If the gold be not impacted against, and be not flush with the edges of enamel, the operation is not such as is demanded for the preservation of remaining tissue. A plane surface of gold should not be made, because the tooth thus operated upon and the one adjoining may approximate closely, and disintegration of enamel take place near or at the part in contact. Restoration of contour prevents such contact, and this prevention is necessary, especially when the tissues of the organ operated upon are not fully calcified. The contour of missing tissue ought always to be so restored with gold that the enamel of one organ may be free from contact with that of the next in the arch (see illustration, *g*), and also that a part of the gold in the one may be in contact with, or certain to rest firmly against, the normal tissue of, or a filling (if one has been inserted) in, the adjoining tooth, when disintegration is not likely to take place, because of the freedom from proximity, and the cleansing (by the saliva or the fluids taken into the mouth, if by nothing else) of the margins of enamel against which the gold has been placed (*h*).*

When operations have been so performed as to entirely prevent fluids or semi-solids from entering between gold and the tissue against which it has been placed, the gold tint may be seen through the light walls or edges of translucent enamel soon after the removal of the rubber dam and completion of the operation. If an opaque or dark line or spot be visible at or near the parts where gold ought to be in contact with dentine and enamel, the operation has been imperfectly performed, and, if not re-performed as it ought to be, chemical action may soon follow and the entire filling prove a failure. If operators were always very thorough in their work there would be no occasion to refer the cause of failure in a dental operation, *per se*, to chemical action.

When operations have been performed in the manner herein described, and all the fillings as carefully and skillfully inserted and finely finished as suggested, they are the best for the preservation of remaining tissue; protection of the enamel over which the gold has been placed, and for the prevention of the wedging of food against and the consequent recession of the gum; they subserve well the purpose of mastication, and present a beautiful appearance.

(To be continued.)

A NATIONAL DENTAL ASSOCIATION.

BY R. B. WINDER, M.D., D.D.S., BALTIMORE, MARYLAND.

(Read before the American Dental Convention at Saratoga, August 12, 1879.)

Mr. President and Gentlemen of the American Dental Convention:—I have been requested to say something in regard to dental organizations, and I have to congratulate myself, not you, upon the opportunity thus afforded me of expressing my views in relation to these matters. * * *

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* The engraving does not represent the fillings exactly as they should be shown, but it gives an approximate idea of the points intended to be conveyed.

The crown and root of the incisor (*i*), in the case illustrated, was missing, and a crown, with labial portion of porcelain, was attached with gold to the adjoining incisors.—M. H. W.

We will not enter into a retrospective view of the means by which dentistry has arrived at its present stand-point of excellence. We are all familiar with the past history of our profession, and need not to have it repeated here.

We have to deal with the present and future, not the past. I think, however, we will all admit without discussion the premise, that society organizations (both local and general) have had much to do with our advancement, and consequently we still need to use these levers to lift us to higher and better things. We thoroughly understand the importance of our State societies, and must therefore labor to keep them up to the highest stand-point. They are the fountains from which the streams of knowledge flow, the laboratories whence the main good comes. The general societies are more like a reservoir, intended to receive these blessings as they are poured in from these various rivulets; the grand emporium into which are carried all the valuable accumulations of labor and toil; the granaries where all the ripe fruits of a rich harvest are stored up as common property for future use and reference; a central library open to all; in the language of Dr. Atkinson, "a big camp-meeting," where all can meet, mingle, and be happy.

It is useless, then, to discuss the question of the necessity and usefulness of either local, State, or general dental organizations. We feel quite certain that if these auxiliaries were swept away dentistry would soon stagnate. I shall not, therefore, in this paper say anything about our State organizations more than that we must have them, must cherish them, must nourish them, and that each State must, in its own wisdom, so arrange and govern its own society as to bring it up to the necessities of the case.

Regarding general associations, the times demand a national organization, which shall embrace in its membership all who are worthy, and know no North, South, East, or West, but whose purpose shall be the greatest good to the greatest number.

The advantages which a national organization would give to the whole profession of the United States are as legion, and we may with great propriety enumerate some of them here.

In the first place, I would say that if the United States are to hold among the different peoples of the earth the reputation in dentistry which has been so earnestly sought and assiduously labored for, it becomes absolutely necessary that we should have a representative and authoritative national organization, indorsed by all the different States, through their State societies, as an exponent of our progress, importance, standing, and culture. An organization of this sort would certainly carry much more weight and authority, both at home and abroad, than we could possibly expect from our present arrangements. It is the very first principle in military tactics—and I believe the same principle will apply in almost everything where there is any labor to be performed, any end to be obtained, or any difficulties or obstacles to be overcome and removed—that in order to *win* "forces must be concentrated, not scattered."

By this arrangement we could get all our materials together. All the best intellect and energies of the profession could, if necessary, be brought to bear upon one objective-point. Such an organization would be your base of supplies. You would have all your resources in hand, and could operate in any direction you might see fit. You would be clothed with national authority and power. We have much talent of one kind or another in the scattered ranks of our profession; it could in this way be brought together and utilized. Such an organization would of necessity wipe out all geographical lines and sectional prejudices (each district of country having the same guaranteed rights and privileges), and the end would be the formation of one grand brotherhood, thoroughly united in everything that could tend to promote the present and future welfare and prosperity of dentistry, and in such a harmonious body of representative national men the highest perfection and attainment in dental art and science would be rapidly realized. This organization would also practically relieve us from much inconvenience and annoyance, from the fact that there are many of us members of the three large associations of the country who would willingly attend all their meetings, and who have for all of them the kindest feelings and best wishes, but who do not like to discriminate in favor of one or the other, and both time and money are wanting to effect a meeting with all. Surely something is due to the comfort and health of the dentist's family, and if his vacation and rest from labor involves the yearly attendance upon these meetings, it becomes irksome. If the State societies would do the work which they should do, all we would need would be a national association where the members of the State societies might occasionally meet. This would not fall hard upon any one, and we could have zealous and earnest meetings, where we could commune, compare old with new, legislate if necessary, and separate and go back to our homes and report all the good that had been effected.

This organization would serve as a Mecca, from which each weary pilgrim might return blessed with the wealth of all the newly-discovered facts in art and science so lavishly bestowed upon all true worshipers at such a shrine.

There was a time when wandering tribes in good old patriarchal days carried with them their government and means of progress.

This day has passed. The progress of civilization demands more than this. A country without a government or a head is only anarchy. The medical profession has its representative national organization. The scientists have theirs. Why should not we? We have nothing but praise to bestow upon the present dental organizations; they have fought a good fight and deserve all praise. They have accomplished much good, and deserve the respect and confidence of all. But this is no reason why we should not have a national organization. It strikes me that there can be no reasonable objection or opposition to this movement. Some people, however, will say, Have we not already a national organization? I would ask them, by way of reply, Can this possibly be so, when we have three general organizations,—The American Dental Convention, the American Dental Association, and the Southern (now National) Association? Does this look as if we had a National Association? You might say, We have several! But is there *one,—the* National? We have but one United States Senate and one House of Congress. We had two Senates and two Houses of Congress at one time. But was this an outgrowth of peace and harmony? There must be a head. The profession requires and the times demand this national organization. The American Dental Convention, which is the oldest general society in the country, and the Southern Association saw this two years ago, and passed the necessary resolutions towards effecting it. They made all sorts of overtures to the American Dental Association, and even went so far as to adjourn and meet at Niagara last year, so as to give the American Dental Association no possible or reasonable excuse for non-coöperation. The American Dental Association was invited the year before to meet with the American Dental Convention and the Southern Dental Association, but, as I learn from good authority, declined, through a misconception of the object in view. So that, as the mountain would not come to Mahomet, Mahomet went to the mountain. But the American Dental Association still refused co-operation. We will not say one word against the American Dental Association. It has done much good, and it is the earnest hope and wish of the speaker that it will continue to live and flourish as long as its career is one of usefulness. The formation of a national organization does not militate against the interests of any other associations, and is not meant to destroy, but to save.

We will now briefly discuss the principles and general outlines upon which we can form such an organization. The first question that suggests itself to me is, How often and where shall we meet? I would suggest, in reply to this query, that we ought to meet annually,—one year in the North, one year in the South, one year in the East, one year in the West, and one year in the center, at Washington, our seat of government. I would have it meet annually in this way, in order that we may more effectually carry out the object of the organization,—the greatest good to the greatest number; because, by swinging around the circle, we adapt our meetings to suit the necessities arising from the scattered condition of our rank and file, and bring the same high privileges within the easy reach of all. Our gain would be in having ultimately the whole profession with us, and our membership might be counted by thousands. Under this arrangement no one could afford to be left out in the cold. I would also suggest as a means of retaining this immense membership, and gradually utilizing it, that no dues be demanded from a member except when he was present at a meeting. With some of us the expense of dues is a very small matter, but there are others (and worthy members of the profession, too) who are not so fortunate. This arrangement would at last amount to the same thing, and place the onus of expense upon each geographical section of the country in turn. Every fifth year we should meet at the seat of government. Obviously we should do this in order to present the appearance of a national organization to the rest of the world, and in that year we might occasionally invite an international meeting. Unquestionably for this purpose our seat of government should be the meeting-place. But we have other reasons. It is to be hoped (if this organization should be a success) that it will gradually accumulate a library, scientific apparatus, and perhaps a museum, and we would certainly need some central place to store our archives. Again, it becomes important in its influence upon the government itself, if we ever hope to secure the appointment of dental surgeons to the army and navy of the United States,—a need which sooner or later must be supplied. For the reasons given, I would then earnestly advise that we should meet as has been suggested; that the geographical divisions of our territory should in the commencement be definitely agreed upon, so as to leave no room in the future for discussion or contention; and perhaps it would be well to ignore the idea of North, South, East, and West, and divide the country into geographical districts, making provision for territory that will in time become States, so that every part of the country should share the benefits.

In regard to the government of this national organization, I would earnestly recommend that the officers and executive committee should each year be chosen from the section or district of country in which the next meeting is to take place, and that the time and place of meeting be also left to the wishes and best judgment of the section or district in which it is to meet. Surely no one would desire to go to New Orleans in the heat of summer, or to Maine in the depth of winter. I think, too, that we should always have some one at Washington to take care of our archives, etc., who could act at the same time as corresponding secretary, so that the whole world might always know where and to whom to direct any communication to our national organization.

As the consummation, after this organization shall have gotten into good working order, I would have permanent sections, embracing the different subjects pertaining to the science and art of dentistry, formed of a limited number of life memberships, and selected upon merit alone,—scientific attainment and artistic skill. I would have these positions the posts of honor, and would offer them as a reward to the diligent and meritorious. Such a badge of distinction would be the highest award our profession could boast, and would stimulate young men to labor assiduously and persistently in some one avenue of science or art, hoping in the end to win and wear this honorable distinction. It would become the goal of the highest aspirations.

I have thus briefly given you a general outline of the principles upon which I think this grand national organization should be formed. But the organization itself will depend upon the report of your committees; the detail and minutiæ of government will have to be mapped out by these same committees, and I know and feel that it will take much time and careful consideration to bring everything into harmonious and proper working order. The question of membership is also to be considered and decided upon. If it can be so arranged, I think it most desirable to have our membership consist of delegates from State societies only. This would compel every State to form a State society or lose its representation; but I would prefer that all members of State societies should have the privilege of membership in this national body.

The Southern Dental Association met in July, in Augusta, Georgia, and has carried out in good faith its agreement with this convention to unite with it in forming a national organization, and has appointed the first Tuesday in September, 1880, to meet with you in the city of New York for the purpose of consummating this great scheme. The president, Dr. Patrick, of Charleston, South Carolina, has plenary powers to appoint the necessary working committees, etc. I learned on Monday that the American Dental Association has also appointed a committee (two of whom are present with us,—Prof. Peirce, of Philadelphia, and Dr. McKellops, of St. Louis) to confer with our committees on this subject. We have a committee to appoint to aid in this great work, and I can only say, where so much is at stake, that I most sincerely hope that the members of our committee will be most carefully selected,—men of enlarged views, good judgment, intelligence, energy, and free from prejudices. All these qualifications will be necessary for this Herculean task.

I thank you for your very kind attention, and most sincerely hope that our fondest expectations in regard to this great undertaking may be fully realized at our ratification meeting on the first Tuesday in September, 1880, in the city of New York.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—NINETEENTH ANNUAL SESSION.

First Day—*Morning Session.*

The nineteenth annual session of the American Dental Association was convened at Niagara Falls, Tuesday, August 5, 1879.

The association was called to order at 11 o'clock A.M., by the president, Dr. H. J. McKellops, of St. Louis.

The morning session was devoted almost entirely to routine business, in the course of which an extended debate arose on a resolution instructing the next Publication Committee to omit from the published Transactions all papers read before the society which should appear in any of the journals prior to the publication of the Transactions. This resolution was adopted.

A committee, consisting of Drs. H. A. Smith, Atkinson, and Dean, was appointed to prepare resolutions embodying the sense of this association regarding the death of Dr. McQuillen.

Adjourned till half-past seven o'clock.

First Day—*Evening Session.*

The association was called to order at the usual hour by the president, Dr. McKellops. The First Section (Artificial Dentistry, Metallurgy, and Chemistry) was called, but was not prepared to report, its chairman, Dr. R. Finley Hunt, of Washington, D. C., stating the difficulties in the way of a satisfactory report at the present time. Subject passed.

The Committee on Volunteer Papers having reported that no papers had been presented on the subjects under the care of the section,

Dr. C. S. Stockton, Newark, N. J., stated his unwillingness to allow this important subject to be passed. The same materials are used, and the same manner of constructing artificial dentures is still carried on. In his belief there was nothing so good for partial plates as gold;

and nothing so good for full plates as continuous gum, especially for the lower jaw. The strongest and best piece of work for full upper plates is a good gold plate with single teeth, accurately fitted. A method of putting in a groove at the alveolar ridge has been proposed, which he had tried in but one case, and it has not been in use long enough to judge as to the merits of the plan. He would be glad when rubber is done away with. When it is, dentists will be better qualified to practice than they now are. In partial dentures the gold should go over the gum, and should be fitted so accurately that the secretions of the mouth could scarcely get in. You don't see such work since rubber has come into the profession. His method is to put in a temporary set on celluloid at once after extraction, and allow it to be worn as long as it can be retained comfortably in the mouth; in some cases it may be necessary to make a second temporary set. When the mouth is ready for the permanent set, he always advises his patients that a set on gold will be the cheapest in the long run, and will, besides, give greater satisfaction in every respect. He did not wish the young men now coming into the profession to be, as Dr. Marvin has put it, "fractional" dentists. He wanted them to know how to take the coin, and the materials of which artificial teeth are composed, and make the plates and teeth.

Dr. W. H. Atkinson, New York, wanted to say a few words as to the necessity of artificial teeth. Nitrous oxide and all anæsthetics for the extraction of teeth are Satan's right-hand aids. Mechanical dentistry was started from a false idea. No anatomist will extract the roots of teeth, whether they have crowns or not, which were put there by the great Architect of all for the purpose of assisting in mastication. Patients had come to him with roots for extraction, which he had refused to extract. If you are fit to practice dentistry you will see the necessity of these remarks. He denounced extracting establishments, and gave an instance of a young woman who went to one of them for the extraction of a single tooth, and when she recovered from the anæsthesia she found that fifteen teeth had been removed, many of which an ordinary dentist might have preserved with ease. When she had remonstrated, she was coolly told that she could have an artificial set inserted which would be more serviceable than her own natural organs.

Dr. Atkinson also briefly referred to some experiments now going on with some hope of success, in the direction of casting gold plates to the teeth so as to be perfectly air- and moisture-tight, somewhat after the process of A. A. Blandy.

Dr. Charles J. Essig, Philadelphia, agreed with Dr. Stockton as to the necessity of every practitioner being a full dentist, and with Dr. Atkinson as to too many teeth being extracted that could be saved.

Students frequently ask his advice, stating their desire to devote their attention exclusively to filling teeth. One young man didn't want anything to do with laboratory work, and on being asked what he would do with those cases where the teeth are lost from other causes than decay, did not appear to have thought of it. Dr. Essig thought there were many cases in which the roots could not be permitted to remain, because they would interfere with atmospheric adhesion. Regarding the new process referred to by Dr. Atkinson, he had to say that some twelve years since Dr. J. B. Bean, of Baltimore, while experimenting on his cast aluminium base, had informed him that it would be quite as easy to cast plates of gold or silver as aluminium, and with probably better results, as the specific gravity of the gold and silver is much greater than the aluminium. It would, however, be a very difficult matter to prepare a matrix for the reception of the melted metal, and none but the most skillful could accomplish it successfully. This was found to be the case in casting aluminium. Plates could be swaged to fit as well as though they were cast. If made to fit the plaster cast perfectly, they will be found after a short time to press unduly on the palatine arch, whereas the proper place for pressure, if any, is at the ridge. If swaged on a zinc die you will have a perfect fit, as the contraction of the zinc compensates for the expansion of the plate and the compression of the tissues.

Dr. T. C. Stellwagen, Philadelphia, was inclined to differ with Dr. Stockton as to the actual acquirements of the young men now entering the profession, in at least some instances. In the college with which he had the honor to be connected every student was required to put up a case in metal, and Prof. Smith was extremely particular to see that the joints were perfect. His object in rising was to call attention to a method of fitting plates little known or practiced, so far as he knew. The first application was made by his former student, Dr. M. H. Cryer, of Philadelphia. The results from it were in some extremely difficult cases simply wonderful. As you all know, the metal plate is liable in swaging to be stretched in some portion or other, just sufficient to make what might be characterized as a bubble, and thus cause the plate to be just so much larger in that one spot. Dr. Cryer's method was to squeeze the plate between the dies by means of a powerful screw. Some time since he had been called on by a person who solicited him to buy a patent for the same thing, but he had found that Cryer's application antedated it several months, and since then had heard nothing further of the patent.

Dr. Stockton. He sold me the method.

Dr. Stellwagen would recommend a trial of the method he had mentioned. He regretted he could not give a positive statement as to the weight or size of the screw required, but it must be able to exert a powerful pressure. It has the advantage of gradually "coaxing," as it were, the metal into the proper shape without the possibility of enlarging at any point.

Dr. Chas. R. Butler, Cleveland. The method of swaging plates recommended by Dr. Stellwagen was contrary to all the accepted ideas on the subject of raising metal plates into irregular forms. The most successful workers in gold get their most perfect results by drop pressure, not by screw pressure. You can't *coax* metals in any other way so well as in the accepted manner. It ought to be known, however, that plates can be swaged with very much less force than is usually applied. The enlargement of the plaster casts is compensated by the shrinkage of the zinc dies, and the stretching or straining of the leaden die is of no consequence and can easily be remedied. You can't swage plates and escape from this straining unless you so confine the metal that it can't get out, and that you can't do. He knew gentlemen who never allowed plates to be *cut* at any part,—they must be *formed.*

Dr. F. H. Rehwinkel, of Chillicothe, Ohio, had been perhaps accidentally led into the right course to avoid warped or twisted plates. You will some of you remember that years ago old Mexican coins were considered fine coins for dental uses, but sometimes it would be found that one side of the plate would work well while the other side would be troublesome. This was probably owing to the hasty, crude manner in which they had been alloyed. Five-franc pieces worked uniformly because of the perfect alloying. He believed that the warping of plates had been caused by imperfect alloying, as he had found that when pure gold was taken and reduced by the addition of the gold and silver alloy, if melted only once it would not work nicely, but if remelted and thoroughly intermixed, it works with perfect ease. He briefly stated a method of preventing celluloid or rubber plates from heating the mouth, by lining with a thin plate of gold. The piece is made in the ordinary way and the plate struck over it.

Dr. Geo. B. McDonald, Conneautville, Pa., had met with the same difficulty that had confronted Dr. Rehwinkel, and on looking around for the cause had found it to be due in the first place to too much alloy, and secondly to too much solder; and as Dr. Rehwinkel found his metal worked better after being remelted, it was probably due to a portion of the silver and copper being burned out. The nearer pure the metal he used the better the results obtained, though he had been taught that twenty-two-carat gold and pure silver were too soft for plates. For several years before he had been crowded out of the field by rubber he had made all his plates of twenty-two-carat gold, and never had one bend in the mouth. Some time since, in the office of an antiquated dentist, who practiced now in the same method and with the same instruments and appliances he had used forty years ago, he had found an appliance to remedy the straining or stretching of the lead dies. It was simply a cast-iron matrix in which the lead was cast, which prevented all stretching of the same.

Dr. Stockton explained the process which he had bought for remedying this defect. The plaster model is thoroughly dried and then suspended in a ring fashioned like the bottom of a flask, and the counter-die of lead poured in, the plaster removed, and the zinc (or, what is better, type metal) die cast. And then, with good twenty-carat gold placed between them, you can very easily and accurately bring the plate down with the screw; but when this is all done, in order to give it the sharp, accurate fit, it requires one or two sharp, heavy blows to send it home. Dr. Rehwinkel's plate worked better after being remelted because the alloy was partially burned out, leaving the gold more nearly pure. In preparing the mouth for lower plates, save the roots where possible. If there is only one left, place on it a solid crown in the best manner you know how to do it, and it will be of great value to the patient in steadying the artificial denture. When you are about to remove teeth, think, and ask yourself the question, If this was your own mouth, would you do it? "Do unto others as you would they should do to you."

Dr. Essig. Any one can test the difference between percussive and persistent force, between a blow and pressure, by swaging a plate of iridiumized platinum. It is almost impossible to accomplish it with the persistent force, while with the percussive force it readily assumes the proper shape.

Dr. Stellwagen was not certain that Dr. Cryer did not strike a blow after the pressure of the screw was exerted, but he had never seen such adaptation by any other method, and especially in those difficult lower cases in which it was the most difficult to obtain a fit.

Dr. J. N. Crouse, Chicago, commended the Richmond process of setting gold crowns, though at first he was inclined to disfavor the idea. Those who have used it most think most of it. He had had the pleasure a few days since of seeing a case where two crowns were inserted side by side by this process; one being attached to the root in the usual way, and the other by its side where there was no root fastened to the first crown, thus making one root support two crowns.

Dr. J. Taft, Cincinnati, would raise his voice against the wholesale destruction of teeth. He fully indorsed what Dr. Atkinson had said in regard to it. It prevails to an alarming extent, and this has all come since anæsthetics came into such general use. There are places, especially in the larger cities, where the teeth are sacrificed as a regular business. When persons go into such places those in charge simply remove all the teeth they are requested to, and many that they are not requested to. He saw recently in a box more than two bushels of teeth which had been sacrificed in this way. Of these not more than two in twenty were *roots;* the rest were teeth such as dentists are in the habit of saving daily; many of them such as might be rendered comfortable for fifteen or twenty years, or an indefinite time. He would be glad if the States with their laws against empiricism would come down on them with irresistible force. (Applause.) Concerning the preservation of the roots, he held that where they can be made serviceable the dentist who sacrifices them needlessly is equally guilty with the surgeon who takes off a hand because it has a sore on it. All the roots that can be retained must be put in order, cleaned and freed from everything that will work against their well-being, and placed in such a condition as to secure that well-being; whether plates are to be put in or not, the roots must be put in order. He also commended the gold crowns recently introduced to the profession. He had seen them in two or three cases placed on roots that had been condemned to be sacrificed; had also seen some cases where crowns had been inserted by this process on roots that were loose, which had since grown tighter. He spoke of a process first brought to his attention by Dr. Peabody, of Louisville, who had been practicing it for some four or five years, of placing porcelain crowns on roots. The root is cut down below the gum sufficiently to hide the joint and the crown accurately fitted. In the case of molars the canals were opened somewhat, and a platinum staple driven in and carefully filled around with amalgam. A bolt to pass through the tooth is soldered to the staple. The bolt is provided with a thread. The tooth is countersunk on the grinding face to receive the nut of the bolt, and is then placed in position and screwed to place, and the countersunk hole is filled with gold or amalgam as desired. He liked this process better than setting on a gold crown.

Dr. McDonald related an experience he had had in a Colton Dental Association establishment, whither he went on a voyage of discovery. During one day that he stood over the chair there were twenty-one patients, from whom eighty-four teeth were extracted, and of these teeth nine-tenths could have been saved by even an ordinary dentist. The question is, What can we do to stop this wholesale destruction of these valuable organs? For one thing, we can ignore the men who do it. When we find a man going out from his college with a degree and taking up with this practice, we can refuse to give him the hand of fellowship, and thus condemn him and his work.

Dr. G. W. Klump, Williamsport, Pa., said this evil was not confined to the large cities, but it had taken root in the smaller cities as well. He spoke of an artificial crown on a root that had been built up by Dr. Webb at the late session of the Pennsylvania State Dental Society.

Dr. W. C. Barrett, Buffalo, New York. In States where the profession is properly organized, why can't they be prosecuted for malpractice? In his view, the men in reputable practice who refer their patients to these places are no better than those who are engaged in the wholesale slaughter. The sending of their patients to these butcher-shops was an indorsement of them, and the proprietors quoted them as their patrons. He had in his mind a patient, a young woman, who had gone to one of these places to have a troublesome bicuspid removed, and when she recovered from the anæsthesia she found that the operator (?) had commenced at the bicuspid on the opposite side of the mouth, a tooth that was in fair condition, but little decayed, and had extracted all the teeth behind it on that side, and was just about to begin on the other.

Dr. G. R. Thomas, Detroit, was free to confess that it was a mixed question. He has advocated that the only thing we can do is to cut ourselves off from the business of making artificial teeth. The men who do this work are not here; they won't read the reports. How are you then going to do anything about it? It is the dentist's duty to hold out to patients that his business is to save the natural teeth; but if all effort fails, and we find it necessary to insert artificial teeth, it may be well to know how to do it. In regard to gold crowns on roots, more can be done than is generally known. Dr. Richmond's method meets a want which we all have felt. He had one put in his own mouth last winter on a root which a dentist of good reputation had condemned eighteen or twenty years ago. The root had been patched up and repatched, and he had submitted to considerable annoyance in the hope of saving it for use. He now knows no difference between it and his other teeth. Has put on several in the mouths of others, and they are doing excellent service. But our first duty is to lessen the demand for artificial dentures.

Dr. E. A. Bogue, New York. If you cannot reach these men by the law you perhaps can by the gospel. To indoctrinate the people with the necessity of preserving their natural teeth was discussed at the foundation of the association, many years ago. He did not know what State had an efficient dental law. He felt deeply the remarks of Dr. Barrett regarding men who sent their patients to the professional extractors. He was in the habit of doing this, and expected to do it on his return to New York. But his patients carried with them a chart of the mouth, with written directions, and if these were disobeyed the extractor would be responsible to him, not to his patient, who knows nothing about it. The very practice which has been condemned here gives these gentlemen a facility which we, who rarely extract, cannot attain. When teeth must be extracted for regulating, or for other reasons, he sends the patient to those who will do it deftly. He most earnestly condemned the wholesale extraction of teeth that could be saved.

Dr. G. J. Friedrichs, New Orleans, thought the trouble lay in the lack of appreciation on the part of the people themselves of the value of their natural organs. A friend of his who went to Europe was called on by a gentleman suffering from toothache. He proceeded to get out a pair of forceps. "What are you going to do?" said the sufferer. "Going to give you relief," replied Dr. D. "Oh, no; that tooth is worth five hundred francs to me," was the reply. If the people here placed the same value on their teeth, there would be no need of wholesale extracting-places. The proper remedy is to educate the people.

Adjourned.

At a special business session held Thursday afternoon, the following officers were elected for the ensuing year:

President.—L. D. Shepard, Boston.

First Vice-President.—C. N. Peirce, Philadelphia.

Second Vice-President.—G. L. Field, Detroit, Michigan.

Corresponding Secretary.—M. H. Webb, Lancaster, Pennsylvania.

Recording Secretary.—George H. Cushing, Chicago.

Treasurer.—W. H. Goddard, Louisville, Kentucky.

Executive Committee.—J. N. Crouse, C. S. Stockton, C. D. Cook, and W. C. Barrett.

The city of Boston was chosen as the place for holding the next annual session.

(To be continued.)

NEW YORK ODONTOLOGICAL SOCIETY.

Regular meeting, held at the residence of Dr. E. A. Bogue, 29 East Twentieth Street, on Tuesday evening, April 15, 1879.

The president, Dr. A. L. Northrop, in the chair.

Upon "Incidents of Practice" being called, Dr. Davis, of New Bedford, introduced to the society's notice a new local anæsthetic or obtunder, for use in cases of sensitive dentine. Its formula not being given, and it not being in the market for purchase, the society could not give it official consideration.

Dr. Robert Arthur, of Baltimore, then delivered a lecture on "Separation as a Preventive of Decay."*

Dr. Benj. Lord, New York. Mr. President: I am happy to have had the pleasure of listening to Dr. Arthur this evening, perhaps because, if I understand him, he has taken a step in advance of his former views.

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* See department of "Original Communications" in this number of the Dental Cosmos.

I believe that a principal feature of his method of treating the teeth, as brought out in his work on the subject a few years since, was the arresting of incipient decay on the proximate surfaces. Now, I understand this evening that Dr. Arthur proposes this treatment as *preventive* also. This is, indeed, an advance; and that, too, in proportion as prevention is better than cure.

I remember, when attending a meeting of the First District Dental Society a few years since, that a part of the order of exercises was the asking of questions. The chairman of the meeting called upon me to ask any questions which I might wish to. I asked one of our leading dentists what he would do with *sound teeth*, and he replied, "Nothing." I think he has changed his mind on that question, from a conversation I had with him a few weeks since. Now, we know that at least one-half of the teeth we meet with decay on the proximate surfaces. We also know that teeth which are not in contact, or which have very little surface in contact, naturally decay very rarely. We also find that if teeth are properly shaped, when sound, by artificial means, they will almost never be attacked by caries. Then why should we leave them without such protection—at least, such teeth as from their constitution will be sure to decay—until they are decayed?

It is very gratifying to hear Dr. Arthur speak especially of treating the sixth-year molar, or of adopting such treatment as will secure the soundness or freedom from caries of that most important tooth. There can be no question of the practicability of preventing decay from attacking the surface in contact with the deciduous molar—where those teeth generally decay if left untouched—if we will but cut away that molar freely, so as to secure a self-cleansing shape. I believe we ought to regard the sixth-year molar as the most important tooth in the mouth. It is the keystone of the arch. Its loss will allow the tipping of the bicuspid and second molar, thus both lessening the grinding surface and shortening the features.

So important is this tooth that, to prevent such very unfortunate consequences, I feel that if we cannot save the crown we ought to cut it off in very many cases, and allow the roots to remain—at least until the other teeth are fully erupted—so as to secure a natural occlusion or locking of the upper and lower teeth, which will generally prevent the tipping after the roots of the sixth-year molar are extracted.

I am sorry to hear Dr. Arthur say that he does not separate the incisors until he observes incipient decay. That practice, I think, is a mistake. I think we can discriminate from the shape and character of the teeth whether separations will be required to prevent decay.

Of course, in making these separations, it is implied that points of contact shall be left either at the necks or cutting edges. If we separate these teeth by wedging, as is suggested, and polish the proximate surfaces, it will do very well if the operation should be repeated often enough. But the chances are that this will not be done. The front teeth, from their not being thick, can be examined with a good deal of certainty as regards the presence of decay in the proximate surfaces; but we not infrequently find that disintegration has already commenced when we little expected it.

In regard to the molars and bicuspids, quite a large proportion of them will be found to be more or less decayed, when we separate, supposing them to be sound. It may be said that the separating or shaping of the front teeth to prevent caries will mar their natural shape and beauty. I contend that this is not the case,—at least as a rule,—and even if this is done in exceptional cases it is better to have them thus marred, and sound, than to have the marring done by decay and fillings. In reference to the shape or character of the separations, I think the V shape is objectionable, particularly toward the necks of the teeth, as it is not self-cleansing, or so readily cleansed as a more parallel space—one more open at the lingual angles if possible; if not, then at the labial.

The manner of the separating, and just the character and shape of spaces which we can secure, will greatly depend upon the condition and shape of the teeth as they are presented to us. I feel, gentlemen, that a brighter day is dawning in the history of the dental art, in that more thought and more attention are being bestowed upon the prevention of trouble.

Dr. J. W. Clowes, New York. This, you know, is a very interesting subject to me. It is not the first time the Odontological Society has heard about separations. I want to say, in regard to Dr. Arthur's method, that when his book came out, some years ago, I bought one and read it very attentively, and from what I read I took courage to do the right thing to teeth. Up to that time I was afraid to touch the enamel and bone in this way, thinking it was wicked to do so; but his explanation was so sensible that I took courage and separated the teeth, and have since pursued a course of separation which has saved them, very much to my satisfaction. I call the operation an *Arthura.* A very frequent item in my bills for professional charges is an Arthura,—Arthura separator-preventor or excisor, as the case may be.

At the time I read his book I wrote Dr. Arthur that it had more real dentistry in it than all the other dental books together, and I mentioned the fact that I had named his operation an Arthura. But the very modest gentleman never replied to my letter at all. Nevertheless, it was from him that I took courage to do the best thing, and from that day to this you know I have occasionally talked to you about separating; talked earnestly about it, and now advise you to do it, whether the teeth are sound or unsound.

Gentlemen, there is nothing better in our practice than separation. You cannot desire that teeth shall decay before your very eyes in order that you may afterward separate and then fill them. Take a sensible view of the case. Acknowledge that "contact among human teeth is always dangerous," and act accordingly in a preventive and saving way. The very fact that contact is danger should be sufficient reason for removing it. Put it beyond the power of the enamel to *contract* decay.

Dr. Arthur, although he gave me courage, is himself too timid. I was timid before he made me brave, but he has come short of the truly heroic in that he does not *really* separate,—thus entering upon the very threshold of the best, only to falter and retreat! Separate in such a way that the very act of eating may be able to produce a healthful change. Do it bravely. There is no such thing, if you handle your instruments properly, as working impairment to the teeth. The true dentist is a nobleman in his profession; his is a high art, which has in him as real expression as when, beneath the master's touch, the canvas reveals the likeness and the life! The *prevention* as well as *arrest* of decay is worthy our most serious consideration. Let us aspire to this high art until we have achieved it. Let us be content only with absolute success. In regard to the sixth-year molar, *don't be misled.* Its advocacy in Dr. Arthur's work is a *serious mistake.* Just so sure as you attempt to save that weak, frail, ridiculous tooth, you will have the bicuspids and incisors decayed. Extract the miserable thing, and give to better teeth their liberty and life.

Adjourned.

FIRST DISTRICT DENTAL SOCIETY.

MARCH MEETING.

DR. LITTLE. I received an invitation some time ago from Dr. La Roche (a member of this body) asking me to present these illustrations of harelip to this society. I regret that I did not have the opportunity of presenting them last month; then I could have shown you the patients. They came under my observation about a year ago,—three brothers, all suffering from compound complicated harelip,—the most exaggerated form of this deformity. The history of the boys is as follows: The mother was an Englishwoman; the father was born in New Jersey. As far as I can ascertain there is no hereditary tendency to any deformity. About twenty-two years ago the first boy was born with a compound complicated harelip; a portion of the upper jaw and of the hard palate was lacking, and, strange as it may appear, this boy never fell into the hands of a surgeon until recently. The next child, a girl, was without any defect; the next was a boy born with this deformity; then two girls, all right; then a boy again, with this deformity; then two girls, all right; then a boy with a simple harelip. This boy lived only a little while. Thus there were five girls, all perfect; four boys, all suffering from this peculiar deformity, caused by arrest of development. One of these boys had a very peculiar hand, of which I show you a cast. In order to give you an idea of these cases I exhibit these photographs,—one is a type of all. One photograph represents the mouth closed, and one the mouth open. There is an entire absence of the vomer and palatine plates, and no union of the upper lip. The so-called intermaxillary bone, as you know, exists in the fœtal state. In this case it was attached to the tip of the nose, containing only one tooth, and over that a small portion of the integument. The roof of the mouth was entirely absent. In regard to the origin of this deformity, the most of you are aware that this is an arrested development, occurring very early in fœtal life, probably in the fourth, fifth, or sixth week, because by that time the upper maxillary bone is formed, and the upper lip is composed of three portions, which are all united,—so if this difficulty takes place, it must take place before the union of the lip and the formation of the upper jaw. Of course there are various degrees of this deformity; sometimes simply one portion of the lip is open; sometimes all the way through; sometimes confined to one side (simple); sometimes on both sides (double); sometimes it involves only the lip and a portion of the alveolar process; then again it goes all the way back, forming a complete cleft, and many times you will find the central bone projecting towards the tip of the nose. In one of these cases—the most exaggerated form of this deformity—it is almost at the tip end of the nose.

A few words about the operation that I performed on these patients. In the first case, that of the oldest boy, I made an attempt to close the roof of the mouth, performing an operation which is called staphyloraphy. I closed the roof—the hard and soft palate—in one operation. The union was perfect, and I congratulated myself that I had begun my series of operations very successfully. But when the stitches were removed, eight or ten days after, I found ulceration on the upper surface of the mucous membrane of the soft parts of the palate, which could be seen by the mirror passed in the nostrils. So that I lost the union of the soft palate together with a part of the hard palate. I have not performed a second operation on this boy, but will do so probably a year from now.

The next point consisted in trying to adjust and arrange for the upper lip. The projecting intermaxillary bone can, in some cases, be forced back, but in this case could not, so I performed the first operation by simply cutting off the intermaxillary bone and turning the projecting bone in, thus forming a proper columna for the nose. The next step was to bring the upper lip together. This was done in the usual manner, and the result was a perfect union, but not a very good lip. In November or December of last year I performed another operation. Two incisions were made on either side, cutting through the lip, and not removing any portion; then the vermilion portion was pushed up, and the inside brought together so that I produced a union of the vermilion. There was a slight indentation of the mucous membrane, but so slight that no one would notice it. The result I consider somewhat unusual, as it leaves the boy with an almost perfect lip. The photograph was taken a few weeks ago.

The second case—the youngest patient of the three—is represented in this cast, and also in these photographs,—side and front views of the same patient.

This boy went through pretty near the same course of treatment, except that after cutting off the projecting intermaxillary bone, which in this case contained two of the incisor teeth, I attempted to form a columna, but it was not a success, and I cut it off and brought down another piece and formed a second columna, but found after union that it was not a very good result as far as appearances were concerned. The sides of the lip were brought together in the same way, and no second operation has been performed. The result is very satisfactory. This little fellow has also a remarkable deformity of a hand. The third finger is absent, and the little finger includes a greater portion of the metacarpal bone.

The case represented by this cast is under treatment. I made an attempt in this case to perform the operation at a single sitting, and have not done as well as I did in the other cases. The lip united very nicely, but one side is very thick, and I shall have to resort to a second operation.

The ages of the patients are twenty-two, eighteen, and nine years.

I think it remarkable that three instances of this deformity should occur in one family, and that they should have been allowed to reach their present ages without having an operation performed. This is the first opportunity that I have ever had of treating an adult who had this deformity.

Dr. Allen. I am a little puzzled to account for the difference between the girls and boys, but I would like to refer to a fact which has been closely observed in the Zoological Gardens of London, where they attempted to raise young lions and failed, because invariably they had cleft palates and could not suck. In Paris, where they attempted the same thing, they succeeded in raising lions with perfect upper arches, and the difference seemed to consist in this: that in London they fed the mother invariably upon lean meat—no bones. There was not taken into the system of the mother lion a sufficient amount of the mineral element to form those arches perfectly. But in Paris, where they pursued a different course, and fed the mother, while bearing her young, upon small animals, ground-up birds, etc., they got a sufficient amount of the mineral element into the system to form a perfect fœtus, and in that way could raise perfectly developed young lions, while in London they failed entirely.

Dr. Mills. Now, how can you explain why it happens in this case?

Dr. Allen. What I would like to know is, whether the mother had a fondness for food containing more of the mineral element while bearing the girls than while bearing the boys.

Dr. Kingsley. I have seen hundreds of these cases, but have never seen any as bad as those presented by Dr. Little; that is, particularly the development of the intermaxillary bone, if it is represented correctly as I see it in the photographs and casts. It reminds me of a case which came to me from Pittsburg, Pa. There had been the same deformity in early youth. There was a double harelip, and a fissure of the palate entirely through the alveolar process. The surgeon, in the effort to do a very nice thing, cut away entirely the intermaxillary bone and the soft external integument. The result was that he had no columna or septum for the nose, and there was a gap left that you could put a finger through, with no hope of filling it up at that age. He came to me at twenty years of age, but all evidence of the intermaxillary bone was gone.

Generally, as in Dr. Little's cases, that appendage is made use of to form a columna for the nose. Some two or three years ago a patient came into my hands, a young lady who had been operated upon by Dr. Carnochan. She was of mature years. The deformity was of this same character. There was as wide a gap in the upper lip as is shown in these cases, but the intermaxillary bone was not so prominent. The doctor performed a very successful operation.

According to the photographs here, Dr. Little has made just as good a one in these cases. I might say that, as far as my experience goes, it is just as good as it is possible for a man to perform. I do not know why Dr. Little operated on the soft palate. I do not know why any surgeon operates upon the soft palate, excepting in one of those very rare cases where the two sides of the palate in its relaxed state will almost touch each other. In such cases there may be a justification for the operation; but I have watched these cases, and have seen the most beautiful operations that any surgeon could perform upon the soft palate, and have seen the same operations cut open again because of a failure to benefit the speech. I believe it is a scientific impossibility for perfect articulatory speech to result from a surgical operation upon the cleft palate, except upon extraordinarily favorable cases. *These* are not! These are the very extreme of cases to succeed at all. I almost wonder that the doctor could have gotten tissue together there and secured a union as long as he did. The difference between Dr. Little and myself would be upon that one point,—the benefit the patient would derive from *any* operation upon the soft palate.

Dr. Little. I would state that I am very familiar with Dr. Kingsley's apparatus for closing the fissure of the palate, but all patients cannot afford to get it. I have operated two or three times upon the soft palate, and in two cases that I have had an opportunity of seeing after the operations there was a decided improvement in the articulation. The only question in my mind is, whether a natural palate is not better than an artificial one.

Dr. Kingsley. You cannot close up a fissure of that kind to any considerable extent without changing the resonance of both the nasal and buccal cavities; necessarily improving the disagreeable voice somewhat, but only slightly the speech. I am reminded of being present with Sir Wm. Pollock in St. George's Hospital, London, some years ago. He invited me to go with him and see an operation that he performed twelve months before. I did so,—we met the patient, and I saw a beautiful operation. I had a newspaper in my hand which I asked him to read. I will admit that that is the worst test you can put a patient to. If you are conversing with a patient and ask a question, you know that the answer will be upon the subject upon which you are talking, therefore your mind is directed somewhat towards the language likely to be used; but give him a paper to read, and, unless the speech is distinct, you cannot understand. In other words, after two or three sentences you will be in very much the same condition as you are when you have only a partial knowledge of a foreign language. After you have lost the first word you lose everything and become utterly demoralized. So in this case of Mr. Pollock's. Really, we could not either of us understand a word he read.

Dr. Little. Do the patients speak as well with the obturator as they do with the closure of the soft palate?

Dr. Kingsley. I can assure you that there are patients in this city who are making public addresses before assemblies, and who are complimented on the distinctness of their enunciation; and not a person suspects that they are wearing artificial palates. It is not improbable that the doctor may have listened to one of them. One gentleman is called upon in this city frequently to make public addresses, as he tells me, of over an hour in length. Now, the secret of that is partly the appliance and partly his cultivation of the use of it. He speaks better than the average public speaker. Why? Because he has got a good organ to speak with, although an artificial one, and he has cultivated the use of it, which the ordinary speaker fails to do. But then, he could not do that if he had not the organ, and I go back to the one point, which is this: that I have never seen a surgical operation where the patient was capable of doing that. But I say, if a surgical operation can be performed with that result, I almost wonder that they do not stop the making of artificial palates. If the appliance is to be worn in the mouth, it is just as well not to close the hard palate by an operation.

Dr. Little. Do they speak as well with the artificial palate, if it covers the hard palate, as they do when the hard palate is closed by an operation?

Dr. Kingsley. I do not think there is any difference. The closing of the hard palate would be simply analogous to the wearing of a set of artificial teeth. So far as speech was concerned, it would not make any difference whether there was an opening above that plate, or whether the opening there had been closed by a surgical operation; neither do I think it would make any difference with the resonance. The narrowing of the nostrils will be of great benefit to the patient's voice; not quite so much to articulation; but it improves the voice, and in a measure the articulation.

The subject for the evening's discussion, the so-called "Riggs's Disease," was then taken up.

Dr. Clowes. I mentioned this subject at the last meeting because I want to learn something in regard to it. The so-called "Riggs's Disease" I have seen a great deal of, but really I have my doubts whether there is very often a permanent cure of it.

I have heard a great deal about cure, but I have not seen a radical cure. Wedging is a great producer of this difficulty, and therefore I am opposed to wedging; but a more general cause than all others is the lack of nutrition in the parts. We see a flourishing tree sometimes, but away out on some limb we see decay. Why does it perish? The sap does not extend to that portion. So it is in parts of our bodies: if there is any portion that is not nourished sufficiently it will perish. There are a great many causes of this. The storms and vicissitudes that overtake us are great causes; just exactly as the storms affect a tree. By the swaying of the branches the young tree is made stronger, the roots put forth, and it becomes more strong, but by and by, as it becomes an older tree, those very storms will rend it. The same effect is produced upon the human body. Now, in my opinion, it is very doubtful whether we can relieve this disease by any method that I have yet heard of.

Dr. Mills. It is quite well known by many that I have devoted considerable attention to the so-called "Riggs's Disease." The history of the origin of this nomenclature is not necessary for me here to repeat. You can learn it by reference to my articles in the Dental Cosmos (five in number) in 1877 and 1878. If I have any ability in this matter, it is because I have studied it with the sincere belief that it is a much neglected and most important subject. My attention was first called to this subject about eleven years ago, when I saw Dr. Riggs perform an operation in his office; and I was at that time impressed with its value. My interest in it has grown from year to year. It is no longer a matter of opinion with me, but of knowledge, resulting from an earnest effort to get at the facts. We all concede that a very large number of teeth are found in a degenerate condition, loosened and discharging from the sockets, etc. Dr. Riggs claims, and I have yet to see it refuted, that the reason the treatment of these cases has not been more successful by those who have given it their attention is because they have failed to recognize what he terms the necrosed edge of the alveolar process, which is found in what he calls the second stage of the disease, when the process begins to give way to the inflammatory action, and there is left a *débris* of necrosed bone which it is necessary to remove; and here lies the secret of success,—*the thoroughness of its removal.* We are familiar with cases which involve more or less of the sockets, and when I say that I believe that ninety per cent. of these cases are amenable to treatment, I wish to be understood rightly. What some call success others do not. For instance, a case is presented with from ten to thirty teeth involved. Is it not better to make the effort to save them all, even though we may fall short? So it is only in degree that Dr. Riggs or myself could claim success; but the more I practice, the more confidence I have in the results; what I was able to do last week I find myself *better* able to do this. I have had cases where I have gone almost hopelessly to work, and, to my utter surprise, after three months I saw results which I did not expect at first. I can now say conscientiously that I know this treatment is a success, and I am proving it in practice. For about thirteen months I was situated where I had an opportunity to see considerable of this treatment. I was stopping at this time in Hartford, very near Dr. Riggs's office. (This was about eleven years ago.) I made up my mind to satisfy myself what Dr. Riggs was doing in his daily practice. I called his attention to my own teeth, which had been in the hands of some of our best men, and he showed me that pressure caused an exudation of pus from between the molars and bicuspids, of which fact I had been ignorant. I had then a good deal of apprehension in regard to the treatment, partly from remarks of others, and had not become very expert in using the instruments. I thought them rather formidable; yet I put myself into his hands believing him to be expert, and my perfect confidence in him carried me through the entire operation of the thorough treatment of all my teeth with great satisfaction, relieving me of the impression that it was "brutal treatment." The success was unquestionable, as the testimony of many who have seen my teeth will prove. This clinic was instructive to me, giving me a new impulse, and from that time I have been pursuing this practice very thoroughly and constantly. And here I must say that the whole thing is contained in a nut-shell,—in knowing how to use Dr. Riggs's instruments. In my opinion there are no instruments that will reach and remove this necrosed edge so certainly and thoroughly as these. Dr. Atkinson tells us, where necrosed bone is found in connection with an abscess, to remove it and reduce to a simple wound, and nature will restore it to health. This is common sense. Now, the conditions in the so-called "Riggs's Disease" are the same; the same treatment will produce the same results. Dr. Atkinson has substantiated, to my mind, Dr. Riggs's observation. Dr. Garretson, of Philadelphia, has done the same; he teaches in his little *brochure* entitled "The Dental Engine in Surgery" that we should "freshen the circular edge of the alveolar process."

Here allow me to state an extreme case which has been in my hands for the last three months, and which has been a fortunate one for my reputation. A prominent physician of Brooklyn consulted me in the interest of a lady patient, in whom he expressed more than ordinary interest, and said that, if there was any value in this treatment, he would like her to have the benefit of it. The lady came; age about thirty-eight years, of nervo-sanguine temperament; she was a very cultivated lady, of good ancestral record. Upon examination of her mouth I found twenty-nine teeth; many of them quite loose; sockets discharging pus freely; gums very much congested. She was in a sadly anæmic condition; in low spirits; had a poor appetite; was much nauseated in the morning; had copious discharge from the mouth at night, causing her to use a towel for protection,—a state of things which was really distressing. This lady had passed through a remarkable mental disturbance—she had suffered by the sudden loss of her husband, child, and mother, in five weeks, which wellnigh crushed her. (This was some two years previous to my seeing her.) She told me that about that time she began to notice a very marked change in the condition of her teeth. This statement confirms those made by some English dentists of the Odontological Society of London (see *Monthly Review of Dental Surgery*, May and June, 1878) regarding the effects of mental strain in this disease. This lady asked me what I thought would be the results of this treatment in her case.

I could only promise, from my experience, to bring about a decided improvement. I have treated the case, and the best testimony that can be given of the results is a statement of the lady herself; to use her own words, "I am as good as new." The improvement in her mouth has been remarkable; the physical condition is decidedly changed, her appetite has returned, and she has grown fleshy, and has red cheeks again. Some of the teeth have improved more than others. Several of the inferior anterior teeth I ligated. Quite a reaction took place after about eight weeks, with two incisors and a cuspid, which at first I could not account for, but finally decided that it was caused by some change in the position of the ligature; but all soon came right again after readjusting it. In this case I also prescribed tonics.

I am well satisfied that one year's time will show an improvement greater than my most sanguine expectations would have allowed me to hope for when I began.

Dr. Odell. I think a great deal of credit is due to Dr. Riggs in that he has called attention to this condition, but I do not agree with Dr. Mills, that success in treatment is due to the instruments. The treatment of this difficulty (which I scarcely yet recognize as a disease, but only as a condition) is almost as old as the study of dentistry itself. Dr. Dunning had very advanced ideas on this subject when I was yet a dental schoolboy. I had a case of a Scotchman, which took me four hours a day for four days in a week, and four weeks, to cleanse his teeth, because they were so loose that I had to put my fingers on and against them to oppose the instrument as I did the work, for fear of pulling them out, and yet those teeth became firm in that short period. I saw the gentleman about two weeks afterwards, and there was not a loose tooth in his head, and he had thirty-two teeth. That is the worst case I have ever yet had, and perhaps also the best. My opinion of the matter is, that in order to get a reproduction of the process we must do what Dr. Riggs has said: we must go back to healthy tissue, and stir up what some surgeons call a "benign inflammation," and then we get pabulum thrown out; and the only reason why we do not get the teeth firm is because we let that pabulum become wasted. Now, can we get Dr. Clowes's "pocket" without the "safety"? We do not want a pocket in the tooth, but around the teeth, and between the teeth; when you are really getting deposition of pabulum, if, touching your finger upon it, you see the impression of the finger upon the newly wept-out protoplasmic mass (a beautiful shining surface of exudation, which we used to consider as pus) acting something like calves'-foot jelly,—if you take care of that, you are more than likely to get a reproduction of process. You may get a partial reproduction and then a retrogression. If so, try it again. Keep your patients built up with tonics all the time. When you are discouraged, do not give up. I had a case lately,—not a favorable case by any means. I went on the principle that I would in medicine: if the patient is sick, do your best; as long as the patient is alive there is hope. In this case I did not lose any teeth; on the contrary, they are all quite firm, though they came to me quite loose. I could touch the apices of the roots of three incisors with the scalers. And I had to be careful that I did not cut off the supply vessels at the apices. In that case I could not have hoped to do the necessary work by instruments alone. I did the best I could with instruments; then I touched the parts with iodine in order to stain any foreign substance or necrosed bone that might be there; then, after removing by instruments so far as practicable anything that I saw which had taken the stain of the iodine, I applied some of the much talked-about aromatic sulphuric acid. The next day it appeared to be a very sore mouth. On touching the parts with my finger, I found that they were covered with an exudation which would stick to the finger. This was protoplasmic gum-tissue. I laid against it a little chip wrapped in a thin film of cotton and covered with glycerin and tannin. In a few days there was a most curious appearance there: the tissue had grown up, but it looked semi-transparent and glazed, and there were red lines radiating from the teeth to the mucous membrane. I bade her not use any stiff brushes, but to cleanse her teeth with a stick, and rub from the gum upwards. She did as I told her, and the result is that those teeth are firm. When I undertook the case the proximate surfaces were exposed nearly to the apices of the roots; but when I had completed the work there was deposition of new tissue enough to bring the gum well up on the root and in regular festoons. The use of the chip is to make the pocket spoken of; it is merely a little strip of a wooden gas-lighter, for the purpose of protecting the forming tissue from injury until it gains strength enough to support itself.

I touch this strip to water to make it soft and pliable; then wrap cotton around it, and dip the thus prepared guard into glycerin and tannin. Contact with this protects the newly wept-out protoplasmic material from solution and retrogression to a great extent; and this readily prepared splint, if bent to the curvature of the jaw, will remain in position simply from the pressure of the lip against it.

KANSAS STATE DENTAL ASSOCIATION.

At the annual meeting of the Kansas State Dental Association, held at Fort Scott, August 5, 1879, charges of "Violation of the constitution and by-laws and other conduct unbecoming a dentist and gentleman" were sustained against Dr. C. Herbert Reeder, of Burlingame, Kan., and Dr. C. Prevost, of Kansas City, Mo. (late of Chanute, Kan.), and they were unanimously expelled from membership in the Kansas State Dental Association. R. I. Pearson, *Secretary.*

AMERICAN ACADEMY OF DENTAL SCIENCE.

The twelfth annual meeting of the American Academy of Dental Science will be held in Boston on the last Wednesday in October, 1879, at ten o'clock A.M.

The annual address will be delivered by Dr. C. A. Marvin, of Brooklyn, New York. E. N. Harris, *Corresponding Sec'y.*

EDITORIAL.

TWO MORE DENTAL SCHOOLS.

We have received the first annual announcement of the Indiana Dental College, located at Indianapolis. Its faculty is composed as follows:

P. G. C. Hunt, M.D., D.D.S., Professor of Institutes of Dental Science.

John Chambers, M.D.C.M., Professor of Descriptive and Microscopic Anatomy.

Junius E. Cravens, D.D.S., Professor of Operative Dentistry, Dental Histology and Pathology, and Secretary.

William B. Fletcher, M.D., Professor of Physiology, Histo-Chemistry, and Pathology.

Milton H. Chappell, D.D.S., Professor of Clinical Dentistry.

C. E. Wright, M.D., Professor of Materia Medica and Therapeutics.

Joseph Richardson, D.D.S., Professor of Mechanical Dentistry and Metallurgy.

Henry Jameson, M.D., Professor of Chemistry and Diseases of Childhood Incident to Dentition.

The announcement is also made of the institution of a Dental Department of Vanderbilt University, Nashville, Tennessee. Its faculty has been organized as follows:

Dr. W. H. Morgan, Professor of Clinical Dentistry and Dental Pathology, and Dean.

Dr. J. C. Ross, Professor of Operative Dentistry and Dental Hygiene.

Dr. R. R. Freeman, Professor of Mechanical and Corrective Dentistry.

Dr. J. R. Buist, Professor of Oral Surgery and Surgical Pathology.

Dr. T. A. Atchison, Professor of Materia Medica and Special Therapeutics.

Dr. D. R. Stubblefield, Professor of Anatomy and Physiology.

Dr. R. W. Steger, Professor of Chemistry and Microscopy.

ADDITIONAL PAGES.

During the present volume we have in three previous issues added eight to the stipulated number of pages of reading matter. The pressure upon our space compels us again to make a like addition to the current number. Notwithstanding this, we must beg the indulgence of friends for the delay in the appearance of their contributions.

BIBLIOGRAPHICAL.

The Advantages and Accidents of Artificial Anæsthesia: A Manual of Anæsthetic Agents, and their Employment in the Treatment of Disease. By Laurence Turnbull, M.D. Second Edition, revised and enlarged, with twenty-seven illustrations. Philadelphia: Lindsay & Blakiston, 1879.

The first edition of this work was noticed in these pages at the time of its appearance. The present edition, revised and enlarged, contains additional practical suggestions as to the employment of anæsthetics, and rules for the guidance of the administrator. It gives a concise description of the different agents, their composition, physical characters, medical properties, tests of purity, and best method of administration. This book is doubtless the most complete summary of its kind which has appeared.

The Summer and its Diseases. By James C. Wilson, M.D. Philadelphia: Lindsay & Blakiston, 1879.

This, the third in the series of "American Health Primers," treats of the Summer, Sunstroke and Heat Fever, Summer Diarrhœa and Dysentery, Cholera Infantum, Summer and Autumnal Fevers, Summer Colds and Hay Asthma, and The Skin in Summer and its Diseases The object of the volume is tersely stated in the opening paragraph, viz., "to point out some of the peculiarities of our summer climate; to show what season-influences at that time act unfavorably upon the public health, and to suggest such means as will best enable each individual to escape the sicknesses peculiar to summer, by avoiding the causes which give rise to them." It contains many valuable suggestions, which will amply repay not only perusal, but remembrance and obedience.

Proceedings of the Dental Association of the State of Maryland and the District of Columbia, held in Washington, October 8, 9, and 10, 1878.

The addresses, papers read, and discussions thereon, are given in full in this report. Several of the papers and the criticisms upon them are well worthy of careful study, but the absence of an index makes reference to any special paper or discussion inconvenient.

OBITUARY.

DR. WM. H. CARTER.

Died, July 10, 1879, at London, Ohio, of cancer of the stomach, DR. WM. H. CARTER, in the forty-fifth year of his age.

DR. CARTER was born in Lancaster County, Virginia, April 28, 1835; attended lectures at the Baltimore Dental College, class of 1865–66; practiced one year in Cumberland, Maryland; removed to Ohio and located in London in 1869. He was an ardent worker in his profession, and his generous social disposition won him many friends, who deeply lament his early death.

DR. C. H. HASKELL.

AT the annual meeting of the Kansas State Dental Association, held at Fort Scott, Aug. 5, 1879, the following preamble and resolutions were unanimously adopted:

Whereas, Since the last meeting of this association death has removed from our midst our esteemed brother, Dr. C. H. Haskell, of Washington, Kan.; therefore, be it

Resolved, That in the death of Dr. Haskell this association has lost an earnest and faithful member, the dental profession an enthusiastic devotee, and the State of Kansas an upright, high-minded citizen, whose untimely decease leaves a place difficult to fill.

Resolved, That our heartfelt sympathies are hereby extended to the relatives and friends of the deceased in their sad bereavement.

A. DOUD,
R. I. PEARSON, } *Committee.*

PERISCOPE.

DIAGNOSIS AND TREATMENT OF SCURVY. REMARKS ON SCURVY IN CIVIL LIFE.—GENTLEMEN: The first cases I will show you this morning are not very frequently encountered in private practice, although we see them quite often in the hospital. These two men are both suffering from scurvy; they have been in the wards but a short time.

CASE 1.—T. H.; is thirty-five years of age; as you see, he is a strong, well-built English sailor. While on a two-months' voyage, from Cardiff, Wales, to Cartagena, Spain, and thence to Philadelphia, he lived almost exclusively upon salt provisions. About two weeks previous to his admission to this hospital, which was only day before yesterday, he began to suffer from pains in the bones and large joints, and the ankles, particularly the left, became swollen. In consequence of this he was obliged to stop work about eight days before entering the ward. He has had no fever; has slept at night; his bowels have been constipated. He has a moderate amount of debility. What he came in for, and what, in truth, seemed to be the most marked symptom, was the peculiar rheumatic pain. I use the term rheumatic rather in the sense in which the patient used it, than in my own; more correct would it be to say that he had pains, particularly around the left ankle joint. I may say, therefore, that the trouble in the knees and ankles has been the prominent feature of the condition for which he sought relief. We examined him yesterday, and accompanying the pains we found, what you shall now see for yourselves, ecchymotic spots on the inner aspect of the left ankle. The skin appears glazed over this spot, even suggesting that something has been painted over it, which the resident physician assures me has not been the case; it looks exactly as if it had been brushed with collodion. The patient complains of want of power in the knee and some pain on motion of the joint. There are no well-marked spots except these you see; a few higher up are less evident. I have already told you that he had also general pains, although it is only the left side which presents this peculiar appearance which you observe here. Now we turn to the other symptoms. What is most peculiar, and really gave us the clue to this case, is the condition of the gums. They are swollen, red and soft; this I find is more marked in the upper than in the lower jaw. Look at this gum! It is characteristic; it is the *spongy gum* of scurvy. The tongue is clean. The breath, at first, was fetid; it is less so to-day. The bowels have been constipated.

The urine has been examined and found to be acid, and free from albumen. The axillary temperature is normal, only 98½° Fahr.

Listening to the chest, more particularly to the heart, I find a soft systolic murmur, most marked over the body of the left ventricle. The area of splenic dullness is large, and extends to the margin of the ribs. Hepatic dullness is normal. There are no signs of dropsy. He has no cough, and has had no hemorrhage from the lungs or nose. This completes the clinical record of the case.

Now I will bring before you patient number two. This is a less well-marked case; and, indeed, were it not that we were aware that he came from the same ship, and had, therefore, been exposed to the same diet and similar circumstances, his scorbutic condition might have been overlooked. It is a case upon which we should dwell less, and this feature might, in truth, have entirely escaped observation. He complains also of what he calls rheumatism, or, if you will excuse the term, pseudo-rheumatic pains, false rheumatism. He labors under more debility than his shipmate.

Case 2 is William B., thirty-two years old. He has the same shooting pains in the legs that number one presents, and looking into his mouth we find that he has the same spongy, scorbutic gum, the same clean tongue. No fever; no albuminuria; no marked dyspeptic symptoms, but the bowels have been constipated. There has been no special depression of mind that he has noticed.

Now, gentlemen, this case is not quite so pure a case as the first, only for the reason that a history of syphilitic infection exists here, and we might well have attributed the pains in the case to the specific complication, were it not for the appearance of the gums and the fact that he came from the same ship as the preceding and more typical case did.

I will only add (and this belongs to the clinical history) that we have the same systolic murmur in this patient that we noticed in number one, except that there co-exists greater rapidity of the heart's action and more signs of debility.

Having examined these two cases, let us now group them together, and see in what points they are alike, and where they differ, and finally make a few explanatory remarks.

Let me first call your attention to the causative element in these two cases of scorbutic disease. Sailors exposed for a long time to the same diet, with the hardships incident to their occupation, with insufficient food,—insufficient in so far as it is composed of salt provisions, which fail to meet the requirements of the system,—are peculiarly liable to suffer in this way. Scurvy, as we now know, is caused most commonly by the withdrawal of the vegetable juices from the daily food, but it is also produced by oneness or sameness of diet, and may be induced by one purely animal. Even fresh meat, if exclusively or inordinately eaten, will cause it after a while; because those elements in the blood that are to be furnished by the vegetable structures are necessarily deficient. It is a mistake to suppose that only salt food can produce scurvy, for it may also occur while eating fresh meat, but we must admit that the salt food causes it more rapidly and completely.

This much for the causation; let us now see if anything of interest is discovered in glancing over the symptoms these cases mutually present. Have we here marked cases of scurvy? and what are the significant symptoms of this malady?

First, Are these marked cases of scurvy? I have called your attention to the rheumatic or pseudo-rheumatic pains in the lower extremities. These are the common accompaniments of scurvy, as a general rule. Patients will come to consult you for rheumatism; and it is only by the light thrown upon the case by the character and locality of the pain, and the co-existing symptoms, that you see that it is not one of rheumatism. Pains and aching in the bones, stiffness in the joints, with suffering increased by motion,—these are the essential features of the pseudo-rheumatic pains that accompany scurvy. My experience is that these painful seizures are almost always confined to the lower extremities; or, at least, it will be there where they will be most marked. Both cases have this symptom, and both cases have spongy gums—of all signs the most significant one of scurvy. While we may have suspected scorbutus, I do not think that we could have determined this diagnosis positively in these cases without the aid of this striking appearance of the gums, characteristic of scurvy. Both patients have a clean tongue, fetid breath, and constipated bowels—also common symptoms of the malady. In this they are also both alike. But in No. 1 we have additional points, not observed in No. 2. We have ecchymosis around the ankle, with a glazed appearance of the skin, which I have found to be very common, if not characteristic of scorbutic extravasations. This patient also has some enlargement of the spleen, and as he has never had malarial fever, the marked enlargement of the spleen has the greater significance.

We also have here a feature which is not ordinarily known in connection with scurvy, that is, the existence of a systolic murmur in the heart. In No. 1 it is more marked than in No. 2, but it is heard over the left ventricle in both cases. There are no signs of valvular disease, nor of cardiac enlargement; these sounds are simply blood murmurs.

I have now given you the general symptoms, and when I have said that neither has had any fever, and in neither has any evidence of renal disorder occurred, I have exhausted the clinical points presented by these cases.

You will ask me, Do such cases occur in private practice? To this I must answer both yes and no. Marked instances of scurvy you are not apt to find in private practice, but less marked or semi-scorbutic conditions from imperfect nourishment we do have, and not infrequently. Cases I could cite from my experience, occurring in families of the higher walks of life; dyspeptic patients, who, having digestive trouble, first drop one article of food and then another, until, finally, they come to mainly a meat diet, or milk, and live almost exclusively upon one article, and this in insufficient quantity. They tell you that they have a poor appetite, cannot eat, everything disagrees with them, and you find that they are scorbutic. They may roll in carriages, and be surrounded by wealth and luxury, but they are starving on insufficient food. You will not expect to find in such patients these well-marked symptoms of scurvy, but you will notice the evident exhaustion, the spongy gums, the clean tongue, the fetid breath, the tendency to constipation, and peculiar pains. To this latter symptom I must again call your attention, particularly in private practice. These pains, similar to rheumatism,—pseudo-rheumatic, if you choose,—constitute the principal complaint for which the patient seeks the physician; for which he uses liniments, electricity, and goes to the watering-places and baths, but all in vain. His pains get no better. He almost always supposes that he is rheumatic. *Now*, gentlemen, you will understand the cause; it is scurvy, though poorly developed; you will be enabled to cure such cases by recognizing the cause, and treating them intelligently. Many, many cases I have helped in this manner, by putting them upon a varied diet, and carefully attending to their hygienic conditions, and general treatment suggested by the condition of the blood. In this, which I may call the scurvy of civil life, I have also found these ecchymotic spots in patients living in luxury, and having everything around them to gratify their tastes.

We now come to the question of treatment. What shall we do for such patients. First, those like No. 1, pure cases of scurvy, must have a varied diet, composed largely of fresh fruits, vegetables, spinach, etc. Onions are an excellent anti-scorbutic, although, perhaps, not very pleasant for those who are in the patient's immediate neighborhood; potatoes are also valuable; oranges, lemons, apples, and as varied a diet as the season affords may be given; in other words, we should introduce the elements of fresh vegetables in the most convenient form. Generally you can do this, but where you cannot adopt it at once, you will find that lemonade, freely used, will prove a valuable substitute. In addition, the patient may have fish, always provided that it is not salted.

When we turn to the question of treatment, irrespective of diet, upon which, however, I would lay the most stress, we find that mineral acids do the most good. Of course, where there is an anæmic murmur you would also think of iron. In fact, he is now taking an acidulated tincture of iron:

℞. Tinct. ferri chlorid., gtt. xx.;
Acid. muriatic., gtt. x. M.

It is given largely diluted with water, three times a day. Upon this treatment we will keep him, with considerable hopes for success.

In Case 2 we must modify the treatment, on account of his specific history; you may have noticed the remains of an old syphilitic eruption upon his face. We shall give him the same diet and the same prescription, but, in addition, a twentieth of a grain of bichloride of mercury with each dose.

We shall not now stop to speculate whether these attacks might have been prevented by the use of lime juice, which all captains should carry with them when going on a long voyage. Whether they could be prevented or not, is an interesting question, but we have already spent too much time upon other points to stop now to discuss it; nor, indeed, does it properly belong to the clinical appearances of scurvy which I have this morning endeavored to show you.—*Clinic of Prof. Da Costa, at the Pennsylvania Hospital; reported by F. Woodbury, M.D., in Medical and Surgical Reporter.*

A Pleasant Remedy for Toothache.—Our cook presented herself to me with a swollen cheek, asking for something to relieve the toothache, from which she had been suffering all night, and for which she refused to have the tooth extracted. As there was nothing of the usual kind at hand, I was on the point of telling her to call later at my office, or go to a dentist, when it occurred to my memory that there was in the house a vial of *compound tincture of benzoin*, which I had been using upon a young mother as a protection against sore nipples.

After cleansing the decayed tooth, I saturated a pledget of cotton-lint with the tincture, and packed it well into the cavity, hoping this would suffice for the time; and bidding her come back in two or three hours if she was not relieved. I was turning away when she remarked that it might not be necessary, perhaps, as the pain was already gone. Supposing her faith had a large share in the relief, I would not allow myself to think that the medicine had anything to do with the cure any more than so much hot water would have done.

But when I arrived at my office there were two other patients awaiting me with the same affliction, and I determined by way of experiment to use the same remedy. To my agreeable surprise both patients declared themselves immediately relieved, and begged a vial of the tincture for future use.

During the winter a number of similar cases applied, and were instantly relieved by the same treatment, all expressing much satisfaction with the remedy.

In December I told my druggist of the discovery, and recommended him to sell it to any person applying for "toothache drops." This, he reports, he has done, and that every one seems delighted with the medicine.—*T. C. Osborn, M.D., in New York Med. and Surg. Brief.*

Absence of Saliva.—In December last a young man twenty-four years of age came to the Dental Infirmary of the Massachusetts General Hospital for advice concerning artificial teeth. The first peculiarity presented was his statement that he had never erupted either temporary or permanent teeth. On examination, however, there were found what appeared to be the remains of the inferior sixth-year molars, but no other indications of teeth. But the more striking anomaly was seen in the total absence of saliva, neither the parotid, submaxillary, nor sublingual gland giving the least evidence of salivary secretion. The tongue, which was deeply serrated transversely, and the soft parts were dry and leathery, so that his speech was thick and apparently labored. In consequence of this condition he had never been able to take solid food of any kind, but had subsisted entirely upon soups and soft, moist food. He was, however, perfectly well, and his food was digested apparently as completely as though it had been mixed with the usual amount of saliva.—*Edward P. Bradbury, D.M.D., in Boston Med. and Surg. Journ.*

Large Salivary Calculus.—The *Correspondenzbl. f. Schw. Aerzte* publishes the case of a sailor who presented a swelling on the inside of the horizontal ramus of the lower jaw. He said he had had similar swellings from time to time during the two previous years, but they had opened spontaneously. Examination showed a large, hard, movable swelling under the left side of the tongue. The Whartonian duct, which was much enlarged at its entrance, was laid open, and a large salivary calculus, weighing one hundred and fifteen and three-fourths grains, was extracted. It consisted of phosphate and carbonate of lime and magnesia. It was triangular, its largest circumference being four and one-third inches, its length one and two-fifths inches, and its breadth nine-tenths of an inch. The other swelling turned out to be a swollen submaxillary gland.—*British Medical Journal*, i., 1879.

Abscess of the Antrum.—At a meeting of the Harveian Society of London on February 20, 1879, Mr. Lennox Browne read a communication (*Brit. Med. Jour.*) on this subject, saying, like much other local disease, it might depend upon general conditions. An offensive discharge from one nostril was the sole evidence of disease in a case of ten months' standing. On douching, pus came from the left nostril. A tooth had been removed ten months before; an opening was therefore made through the socket. Through this injections were made, but without much result. At last the galvano-cautery was used, and then a cure was attained.

The extraction of an eye-tooth is not always successful in curing a case. Abscess of the antrum is, at times, an unsuspected cause of ozena.—*Cincinnati Lancet and Clinic.*

Dentistry in Holland.—The illegal practice of dentistry in Holland (that is, practice without a diploma) is punished by imprisonment for from one to six months and from five to 25—100 florins. These penalties are equally applicable to dentists who employ anæsthetics, chloroform, nitrous oxide gas, etc., as to those who prescribe internal remedies or who sell materials such as powders, elixirs, or other dentifrices for cleaning the teeth.—*France Médicale.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

A LADY patient, for whom I have inserted a full upper and lower set of teeth on celluloid, complains that since wearing them she is troubled with a "ringing" in the ears, which she attributes to the camphor in the celluloid. Has any one else heard of such a result from the use of this material? Is it likely that it has any relation to the trouble complained of?—L. M.

ABOUT a year ago I filled the superior laterals for a lady patient on the same day, and from the same book of gold. I was careful to perform the operation to the best of my ability. In about six weeks the patient called again. The filling in the left incisor was badly discolored—of a dark copper color—while the other was as perfect as when first done. I have polished and reburnished the filling several times, but the discoloration returns. Will some one please explain the cause?—S. W. H.

A LADY presented herself who had a full upper set of teeth on a red rubber plate. She had been trying to use them for a year,—could do so but a little while at a time, as they made her sick, destroyed her appetite, and imparted an intense heat to the roof of the mouth. She said she had lost nearly forty pounds in weight since getting them. I made her a case on celluloid, which she has had about three months. This plate does not make her sick, but heats the mouth the same. Will some one explain this matter, and tell the remedy?—G. J. N.

IN the April number of the DENTAL COSMOS I gave an answer, in part, to the question of W. H. H., as to the noises of the temporo-maxillary joint. In the July number of the DENTAL COSMOS, O. B. L. and Dr. Codman have each added something further that in turn has suggested additional thought to me.

O. B. L. shows very clearly the method by which the sounds are produced by the action of the pterygoid muscles. Dr. C. seems to think the immediate cause must exist in some projection of points of tooth or filling. That this is often the cause I doubt. The sound takes place in consequence of a combined forward and lateral movement of the jaw, by which the condyles are carried each in its turn first forward and outward, then backward and inward. It is the returning, inward movement that causes the click, or what surgeons call an "audible snap."

We know there is a latitude of motion of the jaw, antero-posteriorly, of from one-quarter to one-half an inch. In some cases the upper incisors stand so far forward of the lower when the jaw is in a state of rest, when both condyles are firmly in place, that all or nearly all of this latitude is represented by the space between two incisors. Where such is the case, and there is an equal prominence of the cuspid and bicuspid portions of the superior arch, a considerable forward and lateral motion is made necessary in order that these teeth may be used at all. If the person having this formation has also the habit of changing the food often from side to side in preparing the bolus, we can see how the conditions favor the production of the sound.

If this be the true theory—if cases like the one in question exhibit this formation—the first remedy that might be suggested would be the formation of the habit of using one side only at a time in chewing. If this were impracticable and the case so annoying as to demand radically curative measures, these would consist in either expanding the lower arch antero-laterally, or contracting the upper. Probably the latter would be the method of most promise. The extraction of the superior sixth-year molars, or post-bicuspids, and the gradual compression of the arch till the spaces left have been filled by the approximating teeth, would be suggested. I advance this merely as theory—a basis for observation and experiment.

It is certain that to the person thus affected the sounds seem much greater—by reason of facts stated in my first answer—to himself than to any one else, and it might be well to advise the least possible heed to the matter. It is one of those little annoyances that in the mind of a nervous, sensitive person may become of exaggerated importance.—G. N.

Reply to J. W. West, in July Cosmos.—Tarnishing (blackening) of gold fillings is almost invariably due to an excess of *copper* as alloy in the gold used. Nearly all "cheap gold" is debased with copper to the verge of imperiling its working properties, and fillings made of it nearly always blacken; those with good gold very rarely. Prevention—use gold of reliable manufacture. Treatment—remove the fillings, or burnish periodically with pumice.—A. H. T.

Abrasion(?).—An unmarried lady, twenty years of age, called upon me for the first time eighteen months ago. She had a good set of teeth, of the short-crown style; yellowish in color and with dense enamel. She complained of an unpleasant sensation on the labial surface of the superior centrals, most marked after eating acid fruits. There was no abnormal appearance of the teeth except that they looked as though they had been filed and subsequently burnished. They were quite sensitive to the touch of an instrument. Suspecting chemical abrasion, I prescribed an alkaline wash, and the application of prepared chalk to the inner surface of the lip, and advised the discontinuance of the use of tooth-powder. The patient called again some two months since, when I found the dentine exposed on one of the centrals, and nearly so on the other. Under the glass the enamel presented a rough, semi-chalky appearance, as though produced by the action of a strong acid. The rough appearance precludes the idea of mechanical abrasion. The patient is in good health, and has good digestion. If it be a case of chemical abrasion, very little may be expected from filling, as the walls would soon give way. I will be thankful for any suggestions, either as to cause or treatment of the case.—I. C. C.

Transplanting.—Occasional instances are recorded in the journals of transplanting teeth, or reinserting after extraction. I have had the following experience with a left superior second bicuspid, the patient being a young lady of very active temperament, about twenty-one years of age. The tooth had been filled with amalgam several years ago, and she had suffered with it more or less for the past two years without getting any permanent relief. A slight cold would cause the tooth to ache, with swelling of the face. The patient was very loath to lose the tooth, on account of the prominent disfigurement that it would occasion; but the pain was so great on the eighth of March last that I was compelled to extract it. I succeeded in doing so without lacerating the gum, and found a sac at the end of the root. I cut off an eighth of an inch of the root; cleansed the tooth and socket thoroughly with a solution of carbolic acid. I then held the tooth in warm water until it was about the temperature of the body, and reinserted it in the socket. The next day it was quite sore and the face swollen. I applied extract of hamamelis externally. I continued the same practice until the sixth day with good results, and on the eighth day the swelling and soreness were nearly abated. After two weeks it was well, and the patient began to use the tooth. Now, after four months, I think the operation a success, as she has just told me that she does not feel as though the tooth had ever been disturbed.—D. L. KIDD.

TO THE EDITOR OF THE DENTAL COSMOS:—The papers this morning (August 7, 1879) contain a resolution of the American Dental Association requiring "a good English education as a preliminary qualification of the matriculants" of any dental college. I do not know whether the spelling is correctly copied from the official resolution, but if it be, "a good English education" should have taught its author that there is no such word as "matriculant." Yours truly.—W.

HAVING often found it difficult to get children to open their mouths so that I could extract their teeth, I hit upon the following plan: I procured a piece of brass tubing seven-eighths of an inch in diameter and two inches in length, which I slipped on the middle finger of my left hand, and while the child had its mouth partly open introduced the finger (covered with the tube) between the jaws and passed it back as far as I could, and then found no difficulty in extracting the tooth.—WILLIAM D. KEMPTON.

EDITOR COSMOS:—In the May number of your journal I notice a report of proceedings of First District Dental Society of the city of New York. The incident of office practice by Dr. R. M. Reynolds reminds me of a similar incident in my own practice, which I give *pro bono publico.* Nearly two years ago a little lad of our town, of about nine years of age, fell on the sidewalk, and drove both superior central incisors into the jaw, and so far that it was supposed they were knocked out entirely. I saw the case about two hours after the accident, and on examining with a probe found both teeth. With a thin-bladed forceps I drew them down to their places, and with my thumb and finger pressed the shattered socket into position, and treated with arnica lotion and hamamelis (Pond's extract). The cure was very rapid.

To-day (May 12, 1879) the case presents the following appearance: the right central, which was driven the farthest into the jaw, is as healthy in appearance as though nothing had happened it. The left central had a corner broken off in the accident, and is tender, and will ultimately require to have the pulp taken out; but is so sensitive now that the little fellow cannot have it touched.—SANFORD S. BLODGETT, D.D.S.

THE attraction which blood has for flies causes them to gather about the cuspador in a manner that is exceedingly disagreeable both to patient and operator. A little oil of peppermint dropped into the cuspador will lessen its attractions very much. A few drops of coal-oil will equally disgust the pests, and cause them to seek food in other directions.—J. D. WINGATE.

THE

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ORIGINAL COMMUNICATIONS.

THE USE OF SOFT FOIL.

BY A. W. BUCKLAND, D.D.S., WOONSOCKET, R. I.

(Abstract of a Paper read before the Joint Convention of New England Dental Societies at Boston, June 5, 1879.)

I AM led to suggest for your favorable consideration to-day some of the peculiar advantages to be derived from the use of soft or non-cohesive gold by a method of manipulation which I shall describe.

The idea seems to prevail that soft foil is a filling material which has, perhaps, served a useful purpose in its day, but which has been superseded by something better. Gold was used exclusively for years in the soft or non-cohesive form, and was pronounced by the most eminent practitioners, including such men as Dr. Harris, to be "the only material with which a permanent filling should be made." This is the reputation it had won before the adoption of cohesive gold, and we question to-day whether anything worthy to supersede soft foil has been brought to the notice of our profession. Tin and amalgam, it is true, were both used freely while soft foil was held in such high esteem, but they were used then on the score of economy; and not until so many failures appeared from the use of cohesive gold did any operator presume to use either tin or amalgam on the plea of its being a better agent than gold to protect the teeth. Is it not the numerous difficulties and failures with cohesive gold in the experience and practice even of those whom we consider excellent operators which have resulted in the sweeping statements against gold and in favor of plastic materials by the apostles of the "New Departure"? It is not the purpose of this paper to advocate one filling material to the entire exclusion of any other. We know the peculiar advantages of cohesive gold, and cheerfully give it its place. It seems perfectly adapted to cases in which it is required to build on the whole or a part of the crown of a tooth. This can be done beautifully with cohesive gold. The replacement restores perfectly the original outline of the tooth, and, by good anchorage, we have strength sufficient to withstand all ordinary strain brought to bear upon it, and in every way except appearance it answers the purpose designed; and it seems also adapted where it is required to build on a restoration with comparatively slight depth, as on the grinding surface where the tooth-substance has been worn away by mechanical abrasion. But do instances of special adaptability justify the indiscriminate use of cohesive gold? It is possible, we admit, to use it in almost every position in the mouth, but is it desirable? That method is always best which most effectually secures the object sought with the least inconvenience and expense,—the consumption of time and vital energies being considered as well as dollars and cents.

We assume that teeth decay, and that they come to us for treatment too late for the application of any system of prevention. We must effect a cure. This implies two things,—arrest of decay, and restoration of the tooth to its original form and usefulness. We know of no way to accomplish this except by filling.

Every filling must possess certain properties,—strength, impermeability, resistance to chemical and mechanical action, freedom from galvanic or chemical action upon the tooth, its environments, or the general system, and must protect permanently every portion of the cavity from the ingress and action of corrosive agents.

The uniting of every desirable quality in a single material has not yet been accomplished, but we know of none which combines more good qualities, and to which so few objections can be made, as gold. If this be properly manipulated in a soft or non-cohesive state we have the maximum of desirable properties and the minimum of defects. Soft foil in places adapted to its use has every good quality of a cohesive filling and without some, at least, of its faults. Who has not known almost perfect cohesive fillings which have been lifted from their places and their usefulness lost simply from the effect of thermal changes? Who has ever seen a soft-foil filling, even a poor one, destroyed in this way? But where and how shall we use it?

In looking over the issues for the past ten years of one of our leading journals, I find only two articles on the subject of soft foil,—both approving its use. The substance of the first article is that it should be used on the wedge principle, but the writer does not state just how. The second article says, "The wedge principle is the correct one," and goes on to give instruction for its application by saying, in substance, that after filling the cavity with pellets of soft foil a wedge-shaped instrument should be forced down through the center of the filling, making an opening, which is filled with cohesive gold, and then the wedge is applied again, and so on, "till the wedge refuses to enter," when it may be considered hard enough and ready to finish. This seems to be about all the really valuable information we are able to find on the subject. We can indorse the writer's recommendations of soft foil, and also approve of the wedge principle, but we can hardly feel assured that uniformly good results would follow the adoption of the described plan of manipulation. There is a lack of clearness in the proposed method of filling with "soft pellets," and we are unable to understand just what is meant by the expression, "till the wedge *refuses* to enter."

The successful working of soft foil in places adapted to its use involves delicate and accurate manipulation, and even some of the much-vaunted "definite principles." We will endeavor to describe a method which we have followed for a term of years, differing in some respects from those to which we have alluded. To make this description as definite as possible we will divide the operation into four parts: 1st, preparation of cavity; 2d, preparation of gold; 3d, packing of gold; and 4th, finishing the filling. We deem it practicable (as far as the packing and retaining of the material is concerned) to use soft foil in all simple cavities in whatever position in the mouth; also either wholly or in part in nearly all compound cavities having three or more walls, two of which at some point shall be parallel or nearly so. This is necessary always when the wedge principle is applied, as that implies lateral pressure with resistance.

The proper preparation of the cavity is always of prime importance, whatever the material used as a filling, and is ofttimes so difficult as to severely tax the most experienced. As the operation is frequently a painful one to the patient, the dentist should have a clear idea from the beginning of just what he is to accomplish, and make as few false cuts as possible. I am convinced that thoroughness, which must be insisted upon, will be subserved by using intelligently sharp instruments with a strong and steady hand. All decay and softened tooth-substance should be cut away, except such as may be in proximity to the pulp. This may be disinfected and retained. Solid walls and a clean, solid edge must be obtained, avoiding scrupulously sharp angles, and, as a rule, deep undercuts. Let the walls of a simple cavity be cut parallel or nearly so, and omit those retaining pits so essential in the use of cohesive gold. They are not only difficult to form, but are especially dangerous to the welfare of both the tooth and filling in the places where they are the most required. It is desirable, though not absolutely necessary, that the depth of the cavity be greater than the diameter, yet we would not insist upon applying this rule except in small and simple cavities.

Having prepared the cavity so far as the removal of decay is concerned, and given it proper depth and shape, the next step—the most important part of the operation—is the trimming of the edge. When a filling fails it is usually at the edge, either from some defect in the filling or in the tooth. Sufficient pains are not usually taken with the edge of the cavity, the condition of which has just as much to do with the tight joint as has the gold.

The line which marks the union of the tooth and gold should be as near a geometrical line (which is extension in one direction only) as possible. We shall not always reach perfection, yet, by persistent effort, we can constantly improve our manipulation. A jagged edge marking the line of union of the gold and enamel is the most glaring and at the same time most universal defect. It not only mars the beauty of the filling, but puts it in jeopardy. Who has not seen beautiful fillings with but this single fault? Avoid it by trimming the edge of each cavity with great care, so as to leave a sharp, true line. A chisel with a very hard temper and a keen edge will usually accomplish this best. Apply with direct and lateral motion, giving a sliding cut towards the center of the cavity, and observe with care to keep that part of the edge of the chisel which cuts the enamel in advance of that portion which cuts the dentine. This will avoid crushing the enamel under the pressure of the instrument, and allow of a clean cut. In some cases where the structure of the tooth is poor, we may get a better border to our filling by making this angle of the edge slightly obtuse, but it should seldom, if ever, be acute.

Much difficulty may be experienced before even approximating our idea of perfection in this work of trimming the edge, for as our skill at cutting improves, our sharpened perception increases the demand, and though our results are more and more satisfactory, we may still find room for improvement. Though we would recommend great care in respect to this edge in the preparation of all cavities, yet we deem it most essential to those on the labial, buccal, and proximate surfaces, and especially in those along the cervical wall. Enough might be said on this subject to occupy all the allotted time, but we must pass to the preparation of the gold.

We prepare our gold for use first by folding it into ribbons on a piece of spunk with the blade of a pair of shears, a spatula, or any convenient folder which has a clean, sharp edge, and then we cut this ribbon into short pieces,—the width of the ribbon governing the length of cylinder or mat, as the case may be, and the length of strip the size. These strips of gold are then folded with the foil-pliers into the form desired on a small piece of card-board held in the left hand between thumb and forefinger, rolling them as compactly as possible. We generally use No. 4 corrugated or crystalline surface gold for this plan, never having found them too hard. The ordinary soft-foil cylinders in the market are too soft and clumsy to pack in the way which we shall describe. We give our preference to corrugated or crystalline surface gold for the following reasons: In rolling ribbons into cylinders the layers of gold on the outside of the ribbon do not tear and leave a ragged surface, as when plain gold is used, but simply stretch or straighten sufficiently to give it a plain, smooth surface externally, leaving every layer of gold intact. Another advantage is, the layers of gold do not slide, one on the other, by a little friction on the surface while they are being adjusted in position, as they are sure to do if plain gold is used. The size of cylinders or mats used in a given case, as well as their number, is governed by the size and form of the cavity to be filled and the position in the same which they are to occupy. As a rule, the larger the pieces can be worked to advantage the better the result.

We rely almost wholly upon mechanical union and the principle of gomphosis to retain our filling, and, as it is desirable that the gold work perfectly soft and dead, it must be kept from the flame, lest a cohesive quality be developed. Many of our best soft foils become cohesive by annealing, and this cohesive quality of gold, developed in whatever degree, is always at the expense of adaptability. Gold, when prepared for use, should be kept in wood or paper boxes, never in glass or porcelain, as these latter, by change of temperature, condense moisture from the atmosphere, and thus dampen the gold. We use, and would recommend as convenient, the small wooden trays used by jewelers. These may be covered with glass as a protection from dust, provided the glass does not come in contact with the gold.

Having first prepared a cavity, and then the gold, each with reference to the other, we would proceed with the operation in the following way: If the cavity is very small, say the size of an ordinary pin head, or smaller, such as we find frequently on the labial surface of the superior and sometimes of the lower teeth, we should use but two cylinders,—the first as large as will enter the cavity, the second smaller; both being a little longer than the depth of the cavity. We place the larger cylinder in position, and through the center of this pass first a very fine, sharp instrument,—one that will reach the bottom of the cavity without condensing the gold in front of the point. This is followed by a point a little larger, which will press the gold yet more firmly against the surrounding wall without danger of fracturing the edge of the enamel by contact with the instrument. This opening we fill with the second smaller cylinder, and then condense both cylinders endwise, first with a coarse point, lightly, and then firmly with a fine point. I have given this method of filling these small cavities minutely, as by it I have been able to produce results wholly unattainable by any other method.

All simple cavities, large and small, in all positions in the mouth, should be filled with cylinders which will stand endwise in the cavity, projecting a little to allow for condensing by direct pressure. The amount of projection necessary depends upon the depth of the cavity and the solidity obtainable by lateral pressure while the filling is being packed. Experience here will be our best guide. We use large cylinders where the space will permit, small ones in small cavities, in fissures, and to finish all fillings. I prefer to condense, where I can, by direct pressure against the walls, and to do this thoroughly as I proceed with the work, using the wedge only to make room for the few last cylinders used. The wedge is a good and efficient instrument, with almost unlimited lateral condensing power, but it should always be used with discretion, and especially when the teeth are frail. As a rule, add the last cylinder to some part of the filling not in contact with the tooth except at the bottom of the cavity, and be sure that there it is in contact. It is better to use a small cylinder and be sure that it reaches to the bottom of the cavity, and depend upon lateral expansion, as the gold is condensed, to fill the rest, than to use a large cylinder and not know just how deep it goes.

In condensing fillings of soft foil go lightly over the whole surface with a coarse point, having shallow serrations, and then heavily with the same, which should be followed by heavy pressure with a fine point. This will give a surface and a solidity which will be uniform.

If a fine point is used first it is likely to leave pits which are difficult to fill by lateral expansion of the gold. In going over the filling for the first time with the fine point, should some places appear soft, leave these till heavy pressure has been used on other portions of the filling which appear harder, and as these are condensed, the gold will expand laterally and make the solidity uniform, so that when pressure is brought to bear on places that before appeared soft, it will be found difficult to condense them much.

I wish it distinctly understood that I rely for contact of the gold with the edge of the cavity upon direct pressure while the gold is being packed, and its lateral expansion under pressure applied to its center, never attempting to use the plugger with force along the line where the gold and enamel come in contact. Even the burnisher should be used here with caution, lest the edge crumble, and we have that dark, jagged line which we have taken so much pains to avoid.

In all compound cavities the dentist's tact and general knowledge of the principles of working soft foil must serve him, as the complications and variations are too numerous to describe; but we will mention one or two cases. Those most common are where the cavity opens from the crown and includes one of the proximate surfaces. Here, if the tooth has decayed, or can be cut away sufficiently to get parallel walls, or walls having parallel lines horizontally, without weakening the tooth too much, we would fill wholly with soft foil. But if it has not decayed so that its preparation will leave this shape, and it seems necessary for the sake of strength to retain as much of the tooth which remains as possible, we would fill partly with soft foil and finish with cohesive. If we use all soft foil we would commence by covering the floor of the cavity with narrow mats or cylinders, the ends projecting from the proximate opening. These should be thoroughly and completely condensed, making a perfect joint along the cervical wall. The lateral undercuts, which always exist where the proximate opening is larger than the opening from the crown, should be treated in the same way, and the remainder of the cavity filled with mats a little wider than the remaining vertical depth of the cavity and a little longer than the horizontal depth. Here, also, it is necessary to see that one edge of the last mat used reaches *to the bottom of the space to be filled*, and that *one edge only* be left on the surface, lest it be the first piece to come out.

When we use cohesive gold for finishing in connection with soft foil, it is packed in the usual way, obtaining anchorage either in the soft foil, in the tooth, or in both, as the case may be.

In some very large cavities, where the thorough excavating leaves frail walls and much undercut, we would fill all the undercut with oxychloride of zinc or Fletcher's Dental Porcelain, thus reducing the size of the cavity very considerably. No case of secondary caries has ever come to our notice or knowledge, when either of these plastic fillings remained in place. The non-cohesive gold introduced and fitting so perfectly the nicely-prepared edge protects the underlying material completely. The tooth is thus strengthened, and more of its natural surface and outline retained than is practicable if gold only is used, either cohesive or non-cohesive. The finishing of a filling, though an important part of the work, will take but little time to describe.

If the work up to this point has been thoroughly and properly done we shall here have but little difficulty. Each operation is distinct and separate, and should be completed in its regular order, as there can be no going back to correct mistakes, and each stage of the operation must bear its share of responsibility in the final result. Any neglect or mistake anywhere will surely appear in finishing, but too late for correction, and will mar the beauty and utility of the finished work.

All fillings should be trimmed to the edge of the cavity, and never, in any case, be allowed to overlap upon the tooth. If on the grinding surface, care should be exercised that the occlusion is perfect, not allowing the filling to sustain more than its share of the strain. The burnisher is invaluable in finishing, but its place, as we have before intimated, is on the *gold*, not on the tooth, or any part of it.

Now it would seem that we have said enough to show where and how soft foil may be used. Its peculiar advantages are obvious and almost too numerous to mention. By its use we generally save time; we avoid the necessity of using the rubber dam, the simple adjustment of which would frequently take more time and produce more pain than the whole operation of filling with soft foil; it is easier for both dentist and patient. By the lateral expansion of soft foil under pressure—a feature which we cannot expect in any degree of cohesive gold—we get a more perfect adaptation of filling material with tooth-substance, and because of its soft and yielding nature avoid the danger of marring the edge of the cavity, and thus we secure a more certain preservation of the tooth. Soft foil will expand and contract under the influence of thermal changes without impairing its adaptation to the walls of the cavity and producing a dark, unsightly line. If used in the manner we have described, we get a surface to our fillings which is finished across the layers of gold, making it absolutely impossible for particles to flake up or the surface to wear rough. Neither can the filling come out in part, for the same piece of gold which forms a part of the surface or edge also forms a part of the bottom.

We might add, also, that non-cohesive or soft foil can be worked in many places successfully with an amount of skill wholly inadequate to make a good cohesive filling in the same place. I have in my own mouth several soft-foil fillings which are good witnesses to the truth of this statement. They were put in twenty-four years ago by a dentist of very modest pretensions. They are in proximate cavities in front teeth. The work was done in a rapid and careless manner, at an expense of seventy-five cents each. And yet they remain and perform their work, and, for aught I can see, are likely to do so for a life-time, while cohesive fillings in the same mouth in less difficult places, and inserted by unquestionably better skill, have failed one after another. In fact, they were nothing but failures to begin with. In such cases as this of my own, above mentioned (which is by no means uncommon), we have a combination of circumstances which in themselves are arguments not easily met by the advocates of cohesive gold.

OPERATIVE DENTISTRY.

BY MARSHALL H. WEBB, D.D.S., LANCASTER, PA.

(Continued from page 500.)

If operations have not been performed to check caries and prevent its progress, not only the enamel and dentine become decalcified and are remanded back to primary elements, but, through the continuous presence of agents that bring about chemical action, especially upon tissue where calcification is imperfect or function has been interfered with, the disintegration reaches the pulp, when irritation or disease of this tissue is incited by influences operating through the cavity of decay.

Irritation of pulps may be brought about not alone by the agents that cause disintegration of the hard tissues,—the enamel and dentine,—but also by the impingement of foreign substances, or dentinal caries, upon the exposed or nearly exposed tissue, when some phase of odontalgia may follow.

If irritation of the pulp be caused by the acid condition concomitant with the disintegrative process, it should subside after tepid salt water has been injected and the parts thus cleansed, the softer portions of carious dentine removed, and bicarbonate of soda, potash, or ammonia applied. Should the exposed or nearly exposed tissue be impinged upon by the carious dentine, or a foreign substance which has been forced during mastication upon it, and thus obstruct the nutrient currents, the irritation thus induced should cease after the removal of the agent which causes the obstruction. When the pain has ceased, the parts should be dried with Japanese bibulous paper, and an application of carbolic acid should be made to disinfect the disintegrated dentine which may yet remain and coagulate the protoplasm at the exposed part of the pulp, if there be such exposure. After this has been done a cap of note-paper or fine card-board should be placed over the nearly or fully exposed part of the pulp, so that it be not pressed upon during the insertion of gutta-percha; all which is but preparatory treatment.

After the cavity has been thus cleansed, the pulp protected, and ease secured, the rubber dam should be applied, the temporary filling removed, light reflected upon the parts (as should be done during the performance of every operation) by a mouth-mirror, and all decalcified tissue cut away excepting the discolored or partially disintegrated dentine which may yet cover the pulp, such a protection being very much better than an artificial one. When all this shall have been done, warm air should be used to drive off the moisture (as well as to expel the chippings) which may yet be in the cavity and discolored dentine; then the latter should be moistened with carbolic acid or a saturated solution of salicylic acid in alcohol. Where the pulp is nearly or partly exposed it is best to flow carbolic acid over the part, and, before evaporation follows, take some of the oxide of zinc on the end of a small spatula, place it at the entrance to the cavity, and, with a puff of warm air, spread it over and about the exposure, there to be retained by the deliquesced carbolic acid. After this has been done one of the preparations of oxychloride of zinc should be mixed to the consistency of thick cream, and made to flow down one side of the cavity, over the layer of oxide of zinc and carbolic acid (or pure wood creasote), and along the whole surface of the dentine and to the outer margin of enamel. The rubber dam ought not to be removed for about an hour after the oxychloride of zinc has been placed in the cavity, because more perfect crystallization of the cement takes place when it is dry. These cases should be kept in this condition for some time (in some cases a year or more) before the permanent filling is inserted, although under favorable conditions the operation may be proceeded with immediately or very soon after the oxychloride of zinc has crystallized; but, whenever this operation is to be performed, only enough of the cement should be removed to secure proper and sufficient anchorage for the gold.

Every effort ought to be made to preserve the pulp in each case presented, and particularly in those cases where the tissues of the body have not matured. It is even better to retain a pulp that is in a semi-vital condition than to have devitalization take place before the patient has arrived at the age of maturity, because, in youth, the balance is in favor of the supply of pabulum not only to sustain but to perfect tissues.

If a pulp cannot be preserved and has not lost its vitality to that degree where its removal may be effected with the infliction of but little pain, then, rather than apply arsenic, the ether-spray should be used, which, by the cold induced through the rapid evaporation of the ether, drives or keeps back the neural and vascular currents while the partially devitalized tissue is being removed.

After the bulbous portion of a pulp has become devitalized without the application of a drug, and there has been a line of demarkation made by nature, and this portion of the pulp has sloughed off, leaving the part in the root or roots alive, then such part or parts can be capped, and may remain in a natural condition. When such a result can be had it is better to preserve the remaining portion, and carefully cap the exposed part, than to destroy the tissue and substitute a foreign material, especially if the pulp be not thoroughly removed and such material properly selected, prepared, and placed in its chamber to the apical foramen and in the whole cavity.

When pulp-tissue has been carefully and thoroughly removed before putrescence occurs, and the bleeding which sometimes follows its removal has ceased and the parts have been cleansed, the apical foramen should be entirely closed (so that infiltration cannot take place), and the pulp-chamber and cavity of decay may be at once filled with gold. The bulbous portion of the pulp-chamber of molars and part of the cavity of decay should be filled with oxychloride of zinc.

The parts of the vessels that are ruptured at the apical foramen while the pulp is being removed retract; the capillaries, which conveyed the nutritive supply to this tissue, transport it to other pulps or parts, and when extravasation remains about the end of the root or roots as the result of the rupture of the vessels it is absorbed and a tolerable condition is again established. Some obstruction of the current in the capillaries held within the connective tissue known as the pericementum is sometimes induced through the death of the pulp, but this is evanescent, particularly if the devitalized tissue be at once removed.

In the treatment of pulpless teeth, and especially those wherein the pulp has been dead for some time, or where abscess has taken place, it is best to carry the broach or drill (after all putrescent matter has been removed) just through the end of the root, so as to make a fresh wound and secure healing by "first intention" without inflammation or suppurative action.

If liquid be weeping through the foramen into the pulp-chamber, the Japanese bibulous paper or absorbent cotton that is wound upon the broach and taken to dry out the root should be examined with a magnifying-glass (or, better, place a portion of the fluid under the microscope), and if the parts of the paper or fibers of cotton just beneath the liquid which is upon its surface can be clearly seen, such fluid is protoplasm that has come from the elements of the tissues about the apex of the root. In such cases chloride of zinc, applied upon cotton which is wrapped upon a broach and thus carried just to the end of the root, will coagulate the protoplasm, and the foramen may be closed at once, the entire root permanently filled, and the whole operation completed. If the bibulous paper or fibers of cotton cannot be so clearly seen, there is reason to suspect the presence of pus, when further treatment will be required.

Should pulp-tissue not be removed soon after its devitalization, or before putrescence takes place, sulphureted and phosphureted hydrogen gas from the disintegrating tissue may escape through the apical foramen (particularly if the cavity of decay be closed), and irritation of the tissues that surround or are adjacent to the end of the root be thus induced. This irritation may be caused not only by the gas, but also by particles of disintegrated tissue, or any foreign matter which may be forced through the foramen during the cleansing of the pulp-chamber.

The patient should be informed of the symptoms likely to be manifested, and advised to call at once when pain is indicated or pronounced; and if there be such symptoms after the putrescent matter has been carefully removed, the parts disinfected and cleansed, and the pulp-chamber and cavity of decay temporarily filled with cotton and gutta-percha, this dressing should be removed, a short time given for the escape of the gases or fluid which may be about the end of the root, and the parts again be closed. Several such dressings may be required before normal action has been re-established in and about the vessels within the pericementum, when a permanent filling of gold should be inserted.

When gas emanating from putrescing and disintegrating pulp-tissue escapes through the apical foramen, nutrition of the elements of the tissues about the apex of the root is interfered with, a separation of the elements of a part of the tissues is caused by this gas which is absorbed by the watery fluids exuding from the adjacent capillaries, and inception of alveolar abscess is thus pronounced. If conditions be such that there cannot be resolution,—if there be an accumulation of disorganized or pus corpuscles,—distention of the parts takes place, and, because of the presence of such corpuscles, severe pain is induced and absorption of that part of the alveolar process ensues, all of which continues until the contents of the sac are discharged either through the apical foramen or the alveolus.

If a discharge of pus does not follow the removal of a temporary filling or dressing, the foramen should be slightly enlarged to allow of the escape of the purulent liquid. Even should abscess follow, and though the pain before the pus is discharged through the alveolar process may be severe (unless the patient be kept during this time partially under the influence of morphia), yet no such manifestation will be likely to ensue when normal action of the parts again takes place, the roots are thoroughly cleansed, and these, with the entire pulp-chamber and cavity of decay, properly and permanently filled.

So long as putrescent tissue remains in the pulp-chamber, and the mephitic gas arising from it escapes through the apical foramen, so long may abscess take place; so long as the cause is not removed, so long may such a result follow. A continuance of such pathological phenomenon may eventuate in an almost constant pus-generating surface along the inner part of the sac. This suppurating surface should be changed and the parts gotten in such condition as to favor a return to normal action, else there may be a manifestation of disease known as chronic abscess.

In the treatment and cure of abscess, it is not often necessary to do other than remove every part of the disintegrated and putrescent pulp, force an escharotic (such as carbolic acid or creasote) through the apical foramen and into the sac (so as to destroy its pus-generating surface), and also through the fistule to the surface of the gum; after which, if the parts are frequently cleansed, nature will effect a cure, provided there be no further interference and nutrition be such that normal function may take place.

While some obstruction of the circulation through the capillaries in a part or the whole of the pericementum is concomitant with the abnormal conditions thus far referred to, yet the vitality of these parts is not notably lessened till chronic or erratic alveolar abscess has ensued. Such abscess interferes with the supply of nutrient material to the cementum through the vessels held within the connective tissue (pericementum); and, in consequence of this obstruction, and the irritation kept up through the chronic abscess, the vitality of this tissue may thus be destroyed. Then, and not till then, all the tissues of the tooth—pulp, dentine, enamel, and cementum—are in a non-vital condition. These tissues may not only become devitalized, but if function within and about those adjacent be so interfered with as to prevent the supply of pabulum to them they may become involved, the surrounding alveolar process, and even a portion of the maxilla, may become necrosed, and still further complications arise, because of continuous action and advancing stages of alveolar abscess.

(To be continued.)

STRENGTHENING WEAK TEETH BY HEAVY GOLD AND SCREWS. THE USE OF SMOOTH CONVEX-FACE FILLERS.

BY GEORGE A. MILLS, BROOKLYN, N. Y.

(Read before the New Jersey Dental Society, at Long Branch, July 17, 1879.)

From an experience and observation extending over a period of several years, I have become convinced that this matter has not received from our profession the attention to which its merits entitle it. I think the principal reason of this is, that *the real value of teeth* has not yet been fully appreciated.

A patient brought to the necessity of wearing an artificial denture has passed an unfortunate line, and one that cannot be recrossed. Just now, while I am writing, I am informed that one of New York City's most eloquent preachers—one who has electrified thousands in the church and lecture-room—is a sad example of this foreign invasion. I learn that the cause of his ruined pronunciation is a set of artificial teeth, and that he does not dare open his mouth freely for fear that they would drop from it; and they were inserted by one of New York's (so-called) best dentists.

To be sure, this case does not prove that all artificial dentures are failures; but it does prove that it is a great misfortune to be obliged to wear them. It was not necessary for him to have lost these teeth. They were lost because of the so-called "Riggs's disease," and, in such an organization as I personally know his to be, they were amenable to treatment.

Now to my subject. Let us take for example a lateral incisor—pulpless, decayed on both proximate sides, and involving most of the palatal surface. We will see at a glance that this is a very weak tooth. Now, to fill this according to the common method—replacing the portion destroyed by caries—would not add much to the strength of this weakened organ. Though such an operation is not infrequently made, yet too often it proves a failure, and the tooth is eventually lost.

I hold it to be a great failure of judgment to make such operations without the use of the strengthening auxiliaries which I have referred to in the heading of this article. The first step to be well considered is the preparation of the tooth for the operation, from the mechanical stand-point. After the health of the tooth has been provided for, we proceed to fill the root with cement; then, selecting such size and length of screw as are most suitable, enlarge the pulp canal to the depth required to retain it firmly; in many cases the length of it may be left undetermined until near the completion of the operation. Platinum and iridium are the best materials to secure stiffness.

Having set the screw in the tooth (one as a rule will suffice for a lateral), we so prepare it that direct access can be had and force applied in a line with the tooth. Then make grooves or slots at the base or the cervical part of the structure, in which to commence the operation we have in view. This step is by no means of the least importance, but is one of great nicety, in which thoroughness is demanded, for at this point strength must be secured. This is gained by the use of the screw, together with heavy gold. Too many delude themselves with the idea of gaining strength with light forms of gold at the base. Is it reasonable to suppose that these, however nicely manipulated, can give the strength that Nos. 40, 60, or 120 rolled gold will secure? I do not think any mechanician will be in doubt as to which should be used.

We will now proceed to pack in these prepared places strips of 120 rolled gold (more often that than any lighter number). Cut these pieces of gold nearly corresponding to the diameter of the place they are to occupy. Pack with a heavy lead mallet in the hand of a careful and trained assistant. I use a smooth convex-face filler, and am able literally to swage the gold into the form of slot described. Can any one conceive of such perfect adaptation, solidity, and strength so easily gained in any other way? On this base we begin our work, and proceed rapidly, observing extreme faithfulness in placing all portions of the material properly, thus restoring the lost form of the tooth,—either moulding the contour carefully as we progress, or else simply giving sufficient shape to it, so as to be able to form it afterwards in the finishing process. The use of convex fillers of proper shapes enables us to draw or strap the heavy gold firmly over the edges, securing the great advantage of the swaging principle, unequaled, I think, by any other.

If we have properly prepared this tooth, we have the labial and palatal plates of enamel separated, and the screw extending down nearly or quite to the cutting edge. We have followed the proximate edges carefully, and arrived at a point where we must gain additional strength by clasping, so as to secure these plates from the possibility of being torn apart by the strain they will naturally be exposed to. This has been provided for by cutting off a line or more of the cutting edge of the tooth, which we now replace with gold. This completed, as it *can* be (or as Dr. S. G. Perry, of New York City, would say, "as it *should* be"), we are ready to finish with the help of disks, sand-paper, and the usual polishing materials, leaving a dead finish. This accomplished, we have but little exhibition of gold, and certainly a very substantial piece of work. As a rule, we have performed this operation (including the preparation) in about two hours, and not necessarily with a great amount of physical force expended by either the patient or operator.

I have selected a lateral incisor as an extremely weak tooth, coupled with the conditions named, viz., loss of structure and of the pulp. It must be apparent to any dentist of experience that to have confidence in such operations, as well as to fully appreciate the value of them after they are made, it must have been gained by a practice involving not a few defeats; but it is proved in many instances that the elements of success are found in these. I shall contend that such operations are of more value in such cases than any other, as a general rule, and that in utility, comfort, facial appearance, and durability they are superior to any artificial crown set upon roots. The effort should be to conserve all of the original structure compatible with the greatest amount of utility, and each operator will be governed by the standard of his own judgment and experience.

The auxiliaries of which I have spoken (screws and heavy gold) will find a very practical application to many other operations. It is quite common to find the bicuspids in a condition requiring them. If the pulp be lost, the loss of tooth-structure by caries extensive, and the cusps remain, either cut them off sufficiently or so prepare them that they may be safely secured. It has been said that heavy gold was necessarily a brutal thing to use. Such comments only give evidence of not understanding how to use it intelligently. I give the preference to rolled gold, knowing it to be better adapted to these uses; there is a tenuity to it that is not so perfect in the beaten gold.

It will be noticed that I have also given preference to my smooth convex-face fillers; this I do purposely, for by a constant use of them in general practice since June, 1870, I have gained an experience that has brought to me *absolute knowledge* of their value. While they have been brought into quite extensive use, I am considerably surprised that a greater number do not perceive the mechanical principle involved more readily. Since introducing them to the profession, the same principle has been applied to the instrument used for calking ships, and a royalty of 25 per cent. is paid to the inventor for all such tools manufactured for that purpose. Several dentists have applied the principle to fillers of their own especially favored forms. Dr. A. H. Brockway has a set of his own devising with the convex face, as has also Dr. Knowles, of California.

I think it was in 1874 that a notice was published in the DENTAL COSMOS, signed by the chairman of the Committee on Operative Dentistry appointed by the American Dental Association, requesting information concerning improved methods, instruments, etc. I wrote out fully the history of these fillers, and described their use, principles, and value, forwarding it to the committee; but, to my surprise, when the report of the association appeared in print, not a word of reference to my contribution was embodied therein. Instead of that, a set of instruments was made mention of, designed by another dentist, with the same principle applied.

It has occurred to me that if I should use the term "gold calkers" to these fillers the principle would be better understood by many, for in filling they are used literally for calking gold into the cavities, slots, and crevices. As applied to heavy gold on the margins and beveled edges, they swage or strap it perfectly to the form of tooth-structure. Dr. Fletcher, of England, found in his efforts to produce water-tight fillings with cohesive gold, that he only succeeded by the use of the same principle (the round-faced filler, as he termed it, and so published it this year). I have, for accommodation, had S. S. White apply the Varney serrations to my instruments, and find that the principle is still valuable to a considerable degree; but the fullest advantages are secured by keeping them smooth, for then the gold can be better adapted to the form of the tooth.

My purpose in putting these views before the profession is, that it may stimulate those who are ambitious to excel in that which costs more than the ordinary effort, and thus secure to our patients a greater amount of actual service, personal comfort, and satisfaction.

THE SITUATION.

BY L. ASHLEY FAUGHT, D.D.S.,

LECTURER ON PHYSIOLOGY IN PHILADELPHIA DENTAL COLLEGE.

More than a year has elapsed since the enunciation of the "Basal principles of the New Departure"—a year without a parallel in dental literature. Never before has any one subject commanded so much interest, received so much thought, or occupied so many pages of the dental journals for a whole year. Let us pause and view the situation, for we seem to be standing on the verge of a great revolution.

Two things have distinctly appeared in the verbal war, viz.,—the apparent resolution of many of the opponents of the "New Departure" not to listen to arguments in its favor, and the vigorous, steady, and determined efforts of its champions to be heard and understood.

Early in the beginning of this strife, I was impressed with the belief that from its midst might come the light by which I could escape the difficulties which "accepted practice" was already fast weaving around me. My search was not in vain, for the light, which at first was dim, has grown brighter and brighter, until it is now a pleasure to do work which, before, I felt was impossible for me ever to accomplish.

I would that I could make others feel the benefits of this mode of practice as I feel them. This I cannot do, but those who will mount step by step the ladder which it has set up, I am sure will have a new outlook with every round of advancement. But the labor of climbing must be done. Each must place himself at the foot and go upward. It will be impossible for any one to acquire it from the stand-point of "accepted" methods of practice.

The methods and principles of the "New Departure" are radically different from those we have so long been taught and have believed. Those who would judge of its merits, must become willing seekers after its truths.

They will find it hard, as I found it, to leave the tried golden path of old (though strewn with failures) for the untried (by them) ladder of the "New Departure;" but if they will heed the advice so kindly given, that gentlemen "gradually discontinue this packing of gold into teeth that are so poor, so frail, so unsubstantial, that it is, to say the least, doubtful whether the result will be creditable to your profession or satisfactory to your patients," and "commence, if you will, with those poorer and more miserable teeth which you would condemn to the forceps, and fill them with plastic fillings," the change will then be made not only without shock, but with a gradual and constant rise into a practice filled with much more satisfactory results.

As I read the article in the August number of the Dental Cosmos, entitled "Methods of Practice by an Eye-Witness," by Dr. C. G. Davis, one of the best gold operators in the New England States, I felt it to be my duty to add my testimony to his, as one that was not merely the result of five days' observation, but of over two years' intimacy with the work referred to. Long and earnestly have I labored in the endeavor to satisfy myself of the truth of the statements made concerning "New Departure" practice.

My opportunities have been great to detect fraud, if such could exist; entering the office of the Philadelphia advocate freely and unexpectedly at all hours of the day, I can, while heartily indorsing the statements of Dr. Davis, say at the same time that much, very much of the truth yet remains to be spoken, which may possibly never be wholly known.

While these statements made by the "eye-witness" with regard to practice may appear as something new, it would seem that such assertions as, "If I can say to you that with the gradual abandonment of gold I have *also* equally come to the abandonment of artificial dentures, it behooves you to look to it and *see* the connection which exists, if there be any, between the two;" and again, "Hundreds of patients who have tried for years 'accepted dentistry,' regardless of time, suffering, and expense, and who now for years have tried the dentistry which I advocate before you, have not words sufficiently expressive of their condemnation of the former, or of their satisfaction with the latter;" and again, "With the same energy that has been expended upon 'gold' directed in the channel of 'plastic filling,' *the children of our children should view an artificial denture as a curiosity.* My patients have no knowledge of them. Why should yours have?" and again, this practice "makes of dentistry a *blessing* to the patients, and a *luxury* to its practitioners. I *know*, gentlemen, *because I have it so*," etc., etc., are not likely to have been made except as the result of due reflection and ample ability for positive corroboration.

From my own observation I am convinced that there has been great and systematic labor in the elaboration of what I now believe to be the true principles of practice, and as a natural consequence my private practice has become markedly altered from "accepted" to "New Departure."

I have seen some of the nicely adjusted and complicated apparatus which was constructed for and used in experimentation long before anything was publicly announced; I have seen, too, the tabulated results of experiments which had their beginning many years ago. Knowledge of these has made me feel that principles evolved from such work must be scientific, for they silently spoke a record of protracted, hard, and patient labor.

Knowing these things as I know them, and seeing these things as I have seen them, I can accept the statement of the loss of but five teeth from thirteen hundred patients in twenty years, and would ask of those who are inclined to doubt it, *why* is it not possible?

The main question at the present hour is not, shall we or shall we not use gold? but rather, shall we or shall we not save the teeth that come under our care? Unhesitatingly I reply, *we shall save them!* But remember that it can only be done by firmly planting our feet on the rock of "Dr. S. B. Palmer's electro-chemical theory," and accepting as a solid basis Article III. of the "New Departure," "failure in operations is mainly due to incompatibility of filling material with tooth-bone." Here is a rallying point, sure and steadfast, and from it the field of investigation widens out rapidly until it exceeds the boundary of our present vision.

Instead of idly contending for the use of gold, with daily results strongly pointing to the negative, would it not be better and far more scientific for advocates of "accepted practice" to expend their time and energy in this field of experimentation?

I would also call attention, in this connection, to the fact that in all the bitter struggle against "New Departure" practice, the master efforts of its opponents have been mainly directed to the support of gold, by advocating it for itself; and when they have deviated from this line of attack, it has been to deride personally the advocates of the new movement; to complain of the appearance which they imagined the plastic work presented (but which it does not); to say that it lowered the standard of dentistry, etc.; but never, in any instance, has an attempt been made to prove that plastic fillings, properly inserted, do not perfectly protect and save the teeth for the period during which they remain in contact with the walls of the cavity; or that they ever, even in teeth of the poorest quality, so frequently return sloughed out and ready for removal with a fine probe, as is the case in very many instances with gold.

This is the vital spot towards which the assailing darts should be hurled, and it stands forth boldly as a mark. Prove that plastics do not save the teeth, and there will be little need to admit the tottering steps of gold by propping it up. Practitioners will revert to it then as a fortress of old.

But unless more scientific arguments are produced, and more facts arrayed against "New Departure" in the years to come than have been in the year past, the situation of gold as a filling material FOR TEETH BELOW MEDIUM IN QUALITY, will not only be precarious, but decidedly bad. The day is not far distant when it will be too late to teach the dental student any principles or practice other than those *now* known as "New Departure."

ANTRAL DRAIN-TUBE.

BY J. N. FARRAR, M.D., D.D.S., BROOKLYN, N. Y.

It is not the purpose of this paper to discuss the subject of diseases of the antral cavity and their often intimate association with alveolar abscess, but to explain a device which I have found very useful in assisting me in the treatment of these diseases by preventing premature closing of the drainage-canal from a diseased antral chamber.

The usual opening, whether formed by the removal of a tooth or by a trephine, is liable to close, and it is important to successful treatment that it should remain open, not only for easy passage of injections, but for the use of the aspirator in evacuating the diseased chamber. The employment of plugs of cotton or lint, or the use of quills, rubber tubing, and the like, is objectionable, because frequently irritating to the walls of the canal, causing them to bleed on the slightest provocation, and is besides filthy; moreover, any of these is liable to displacement.

The device referred to, the result of my efforts to overcome these difficulties, has been used in several cases with such gratifying success, not only to myself but to my patients also, that I have been led by the suggestion of professional friends to cherish a hope that, by making public its description, its usefulness may be extended.

Fig. 1.

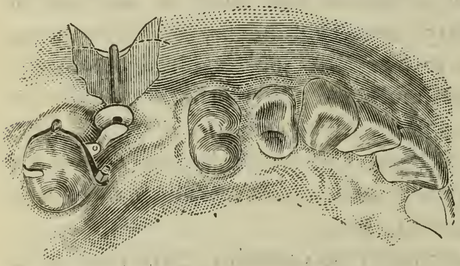
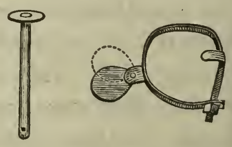


Fig. 2.



Farrar's antral drain-tube.

Fig. 1 illustrates the fixture secured in its proper relation to a cast of a portion of the upper jaw of one of my patients who was under treatment for disease of the right antral chamber, the canal extending from the socket of an extracted root of the first molar tooth. Fig. 2 is a similar, though somewhat differently constructed device.

The device is made in two parts, a canal-tube, or solid plug (I prefer the tube), and its retainer or support. The tube is made of gold or platinum, about three-quarters of an inch in length, or just sufficient to extend about one-eighth of an inch above the floor of the antral cavity, and of the size of the canal desired to be maintained.

To avoid irritation by its introduction, it is closed ovally, like the end of an egg, at the antral extremity, but has two or more round or oval holes on the sides which will allow by oral manipulations free passage of liquids if desired, but which I generally prefer to have closed (with gutta-percha) in order to prevent unpleasant noisy regurgitation of the air, etc., in the act of swallowing.

To secure the tube in position and prevent it from passing entirely into the chamber, a thin rim about one-tenth to one-eighth of an inch wide, of the same metal as the tube, is soldered to the outer end so as to resemble the brim of a hat, and which is made to fit the contour of the surrounding surface of the gum. The device is retained in the desired place by a little trap, ear-valve, or slide, which moves back and forth by playing on a rivet-joint soldered to a band or binder as thin as writing paper, and about one-tenth of an inch wide, made firm to a neighboring tooth by a very small screw and nut, as illustrated in the cuts. If there be a cavity in some near tooth, the valve and its hinge connection may form a part of, or be soldered to, a wire arm fastened into and extending from the cavity. In some cases the wire alone so bent as to enter the orifice of the tube is sufficient. I have made successful modifications by having the slide-trap play in a groove or pass through small staples soldered to the band, something like an ordinary door-bolt. If there are no teeth to which this retainer can be secured, it may be dispensed with and the tube or plug be held in position pretty well by an ordinary suction-plate.

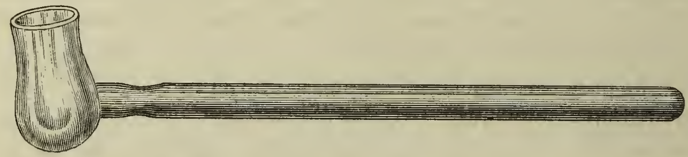
To gain access to the chamber for treatment, slide the valve to one side, and carefully removing the tube or plug, pass the nozzle of the syringe through the canal and inject the antral chamber. If done carefully the operation is not only accompanied with little or no pain, but seldom requires more than four or five minutes, and can generally be done as well by the patient, although the treatment is often repeated once or twice per day. By this plan I do not require to see my patients oftener than once in one or two weeks.

A DENTAL APPLICATOR FOR COUNTER-IRRITATION.

BY EDWARD C. KIRK, D.D.S., PHILADELPHIA.

Counter-irritation as an abortive treatment in the initial stages of pericemental inflammation has long been recognized as a valuable measure, its active employment often affording immediate relief from the intense pain and arresting inflammatory action. The usual method pursued in such cases is to either deplete the tissues upon and around the root involved by free scarification and the use of warm water to increase the bleeding, or to apply on a pledget of cotton a few drops of a mixture of chloroform and tincture of aconite-root in varying proportions, to be held in position for as long a time as the operator may judge necessary. The rule given by some is to continue the application of the pledget till the tears run down the patient's face. But the operator cannot know positively how long the application should be continued, because he is unable to see what is taking place underneath the pledget. Again, he will very frequently be misled, for many patients will endure almost any amount of pain with the utmost composure and without shedding a tear, while with others the same treatment continued for only a few moments will cause an abundant flow of tears and an amount of resentment impressing the operator with the belief that he has caused an undue amount of pain by carrying his treatment to an unnecessary extent.

To obviate these difficulties, and at the same time afford a neat and convenient method by which counter-irritation may be produced, even to the point of vesication, the simple contrivance here figured has been made. It consists of a small glass cup about two centimeters in height and one centimeter in diameter at the mouth. The upper portion is somewhat expanded, after the manner of an ordinary cupping-glass. To the side is attached, at a convenient angle, as shown in the cut, a solid glass handle about ten centimeters long. To use the instrument, a pledget of cotton of sufficient size to be self-retaining is placed in the expanded portion of the glass cup, not allowing it to approach too closely to the orifice; chloroform or strong liquor ammonia is then poured upon the cotton. The mouth of the instrument is then applied closely to the gum over the root affected.



The advantage which the instrument possesses in being made of glass is that it allows the operator to see precisely what is taking place, enabling him to control with the utmost nicety the action of the vesicant; and without regard to the feelings of the patient he can produce the precise amount of counter-irritation desired.

An accident which is liable to happen where the ordinary dressing-forceps is used to carry the saturated cotton to the gum is the dropping of portions of the irritating fluid into the mouth of the patient. The use of the applicator entirely obviates this difficulty.

For counter-irritation upon other parts of the body a larger instrument of about three centimeters' diameter at the mouth would be preferable. The pain produced is not unduly severe and soon passes away.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION—NINETEENTH ANNUAL SESSION.

SECOND DAY—*Morning Session.*

THE association was called to order at 10 o'clock, President McKellops in the chair.

Dr. D. C. McNaughton, Jersey City, offered the following resolutions, which were adopted:

Resolved, That a committee, consisting of one member of the association from each State and from the District of Columbia, be appointed by the president to make (with the assistance of the State societies) a complete directory of the dentists of the United States.

Resolved, That the members of the committee be directed to bring the project before their several State and district societies, so that such action may be taken as will rectify the directory each year.

Resolved, That when any State or district society shall present to this association a list, alphabetically arranged, of dentists within such State or district, then this association shall, through its Committee on Directory, present to such State or district society all lists of dentists in its possession, and shall continue to exchange the amended lists as long as such shall be continued by the several State and district societies.

The Committee on Volunteer Papers reported that two papers had been offered which they considered worthy of the attention of the association, one by Dr. T. C. Stellwagen, on "The Natural Dentine for Capping Pulps of Teeth," and the other by Dr. G. J. Friedrichs, on "Erosion of the Teeth and its Local Treatment."

The Second Section, Dental Education, was called and reported through its chairman, Dr. J. N. Crouse. The following is an abstract of the report:

There is no subject of greater importance for this association to consider than "Dental Education." The growing sentiment in favor of raising the standard of education has been recognized by the colleges, and has resulted in many of the advanced steps recently taken by them. The association claims the right to exercise general supervision over the whole subject of dental education. The English law, in reference to this matter, requires from students a preliminary examination in English, Latin, arithmetic, algebra, geometry, geography, English history, and, at the candidates' option, in Greek, French, German, mechanics, chemistry, botany, or zoology. Such a standard would not be practicable here now, but we should require at least a good English education. There should also be unanimity among the colleges as to the requirements for graduation. In some schools, as now conducted, attendance on two full courses is required; in others five years' actual practice is received as an equivalent for one course; in others the candidate is graduated when ready to receive the diploma, without regard to the time of attendance; in still others attendance on three full courses is required. If the colleges cannot agree upon some uniform action the association should take steps to aid them in uniting on one basis. The five years' practice clause should be abandoned. The section is of the opinion that the association can be of use to the colleges in sustaining them in regard to the granting of diplomas. Although the association last year took strong ground against the continuance of the five years' actual practice proviso, none of the schools that had previously allowed it have abandoned it, while the new schools offer those in practice five years the inducement of a diploma after attending one course; and one of the largest of the older schools, which had previously announced its determination not to receive the five years' equivalent, has since stated its intention to abide by the action of this association, and would thereafter regard five years' practice as an equivalent to one course, as though this association had recommended instead of condemning that procedure. We should therefore take strong ground against it.

The section also views with anxiety the tendency to multiply dental colleges, evinced by the birth of three or more since the last session. Even conceding to their founders all that they can claim, neither of them can, in the nature of things, hope to equal the best of those before in successful operation. This association should by a decided voice discourage this multiplication of schools, which, in the opinion of the section, can but tend to lower rather than raise the standard of excellence. Concentration of interest in and effort for the welfare of the best of the larger schools would surely tend to the greatest advancement. The question as to whether dentistry is a specialty of medicine is unimportant; but, believing that a medical education is a desirable adjunct to a dental education, the section would urge that acquirement by graduates in dentistry at the earliest practicable day.

To carry out the views enounced in the report the section would offer the following resolutions for the action of the association:

Resolved, That hereafter no dental college shall be entitled to representation in this association that does not require a good English education as a preliminary qualification for its matriculates, to be ascertained by examination.

Resolved, That the colleges shall hereafter grant no diplomas except to those who attend at least two full courses of lectures; except that practitioners of dentistry who present satisfactory evidence of having entered upon practice prior to July 1, 1875, and of having continuously followed the same from that date, shall until July 1, 1885, be entitled to present themselves for examination for the dental degree after attending one course of lectures in a duly recognized dental school.

Resolved, That no dental college shall be eligible to representation in this association that does not in their next annual announcement give notice of their adoption of this limit to the conferring of the degree.

Dr. C. W. Spalding, St. Louis, while agreeing in the main with the ideas set forth in the report, emphatically disagreed with it as to there being any cause for anxiety concerning the establishment of new colleges. The trouble is that we have not half enough colleges. We should establish them wherever there is call for them, and thus bring the means of obtaining an education to every man's door, so that he can enter them without regard to the state of his finances. There are many young men who cannot afford to go eight hundred or a thousand miles from home, with the great expense attending, for the purpose of being qualified. Shall we cut off the chances of obtaining an education from such men, and have them come into the profession after two or three years of private pupilage? The only question should be as to the character of the institution. The time is fast coming when a man who doesn't hold a degree will not be recognized. At present not one-fourth of those in practice hold a degree, and of the new men coming in not one-fourth acquire it; so that seventy-five per cent. of those now entering the profession come in without the degree. And now this proposition is made to cut off the facilities for receiving an education. We should rather place the means for it within the reach of all. It would be taking a step backward to reduce the number of the colleges,—a proposition from which he would most earnestly dissent.

He had been an advocate of granting the degree to prominent men who had been years in the profession, and whose attainments would warrant it, but he believed that no man should hold a degree unless he can pass an examination. The question to be decided before the degree is granted is, is the candidate qualified, is he competent? If he is, then we should grant him the degree without reference to the time spent in study. The examination of those who came in under the clause allowing those who were in actual practice before July 1, 1875, should not be held by the faculty of the college granting the degree, nor, indeed, by any one pecuniarily interested in passing the applicant.

Dr. E. A. Bogue, New York. Dr. Spalding is the first one connected with a college who has expressed the view that the examining board should not be connected with the faculty of the college granting the degree, with which sentiment he heartily agreed, as personal intercourse with the candidate, extending over months, must surely bias the instructor. In regard to the question, How we are to keep out the young men who would come in to practice through other doors than by taking the degree, we should pass State dental laws to regulate practice. That is now the tendency. The multiplication of colleges seems to be a present necessity, though he viewed it with regret; but after a time, by a process of natural selection, the overplus will be weeded out, and those only that are fittest to survive will be left. Uniformity of qualifications for the degree throughout the land is to be commended.

The passage of the English law was caused by the presence of American graduates in Europe, who, by their finger-craft, sometimes excelled the native dentists, and by their lack of education made the educated Englishman ashamed. A feeling was thus engendered that the American system was not altogether the best. The result has been the passage of that law. Another influence largely operative in favor of the law was this: the dental college there saw numbers of its students going to America for their degrees, and naturally its directors looked around for the cause, when it was observed that students frequently would take one course in the Royal College of Surgeons and then come over here, attend one course in some one of the American colleges, and return home legally "doctors," while the graduates of the home college were compelled to be content with a plain *Mr.*, though they had studied years to obtain simply the license. The directors of the English college saw that this door must be shut, and they have shut it, and the moment that was done a higher standard of qualifications could be maintained. This can be done here and by the same machinery, though perhaps not so readily as there. He foresaw the time when there would be State laws, passed one by one, until it shall be quite possible for a curriculum to be established extending over such a length of time that students will not fail to be properly qualified for the practice of their profession.

Dr. C. S. Stockton. The theme that everywhere meets the dentist is, What shall be done to elevate dentistry? He had held to the opinion that the best thing would be a few large, well-equipped colleges, centrally located; but he was free to confess that a change had been wrought in his views by the arguments enunciated by Dr. Spalding. Many now come in through examination by the State boards, who, in the very nature of things, cannot be as well qualified to conduct examinations as those regularly engaged in teaching. He would favor saying to candidates for admission, you must go and take your degree, let it be in one year or one month or one week. If you are competent, you will know it, and those who examine you will know it, and they will give you the degree, and that degree should be so high as to be universally recognized. He sees no other way out of the difficulty. Candidates should be examined not only in dentistry, but in preliminary education.

Dr. H. A. Smith, Cincinnati, presented the following statistics as to the numbers of dental practitioners, students, etc., in the United States:

Total number of matriculates for 1878–79	672
Deduct those from foreign States	50
Number from United States	622
Total number of graduates, 1878–79.	242
Deduct those from foreign countries	33
Number from United States	209

Five States have more than one-half of all the graduates, viz.:

Pennsylvania	39
Ohio	24
New York	18
Massachusetts	17
Maryland	15
Total	113

Estimated number of dentists in United States	12,000
Number of dental students	1,800 to 2,000
Number in attendance at all the colleges from United States in 1878–79	622

This statement shows that not more than one-third of the dental students ever attend the colleges. It is highly probable that not more than one-fourth of the number have of late attended. If all of the dental students attended, the colleges would have about two hundred students each.

Dr. Smith did not contend that the estimated number of students was accurate, but the principal fact shown was that, where the facilities for obtaining an education were, there were the graduates; that those States in which the colleges were located supplied a large proportion of the graduates.

Dr. Bogue was reminded that in his statement regarding the English law he had failed to make himself clearly understood. The law, as he understood it, would be the remedy for diminishing classes in the dental school.

Dr. C. D. Cook, Brooklyn. The law was *a* remedy, not *the* remedy, and it was passed after three years of agitation and discussion of the questions involved; but he had no idea that it was originally intended as a remedy for the falling off in the number of students at the college.

Dr. J. N. Crouse believed that the college faculties wanted the first resolution passed, and therefore it did not need discussion. Students should have enough knowledge of the language to comprehend the lectures at the college when they hear them. The second resolution, allowing those in practice July 1, 1875, to receive the degree after only one course, was a compromise amendment. He had been delighted to find some of the representatives of the colleges would make the term of pupilage three years instead of two. The necessity of wider instruction was shown in numberless ways. For instance, on the subject of chemistry we have had practically no report for two years. Regarding Dr. Spalding's suggestion that we should place facilities in the reach of poor men, it was his observation that among the best men in the profession were those who had to work for the money to pay for their tuition. They were the ones who had felt the cost and appreciated the advantages which their education gave to them. Some men are born to be poor, and all the facilities you may hold out to them will not lift them out of poverty. Lay down your rules for graduation, and then if you have the right material they will work to the rule laid down if it takes two years or three years. As to the establishment of additional colleges, an effort had been made for several years to establish one in Chicago, but he thought it no shame to confess that there wasn't a college faculty in Chicago, and he doubted if there were two in St. Louis, and didn't feel sure there were two in Nashville, if there was one.

Dr. J. G. W. Werner, of Boston, stated that he did not think some of the gentlemen who had spoken understood the subject, or if they did, they could not understand their own language. In this free, democratic country a law for the protection of legitimate practitioners of medicine or dentistry is not considered necessary. In Europe dentistry is considered a part of medicine, and is protected by the law. As long as you have no law it is useless to talk about having but few colleges and a high standard of attainments, and all efforts to advance will be a failure. As long as you rely on the intelligence of the masses you will receive just what you deserve and just what you have received.

Dr. Atkinson. What does a dental degree mean? We have thirteen dental colleges trying to get at some means to select from the mass who present themselves the best material, so as to secure those who will be a credit to the schools, an honor to themselves, and a blessing to the world. This is the underthought of all who have spoken. Before a dental college was established the knowledge of the need of education for dentists was in the mind of Chapin A. Harris incubating for years. From him it was communicated to others; and when the medical colleges were approached with a view to the establishment of chairs for the special teaching required, they had turned the cold shoulder because they lacked the intelligence to see the need; they were handicapped by clinging to the old formulæ. He would prefer to have a student come to him without an A.B., A.M., or M.D. Why? Because these degrees are false. There is not a degree conferred in America that isn't a lie, because of the mischievous methods of teaching in the institutions that confer them. He would prefer a student perfectly green without the disability imposed by false methods of teaching.

Dr. W. C. Barrett. If he understood aright, Dr. Atkinson would abolish all education. The assertion is loose, and hangs over at both sides. We must cut our coat according to our cloth. We cannot reach a higher standard by abolishing all methods of instruction. With Dr. Atkinson's idea that we should require no preliminary qualification he should always take issue. It is essential that students should have some education. We should carry the means of obtaining an education to every one, so as to afford the fullest, freest access, but should provide that they come into the college thoroughly prepared to pursue the studies, and emerge from it thoroughly prepared for practice. On this he has decided views. By the statistics of Dr. Smith, the State of Illinois had but three graduates last year,—a showing that indicates that that State needs some missionary work at home. An attempt to restrict the means of education comes with a poor grace from any man from Illinois. We all desire to reach a higher standard, but the method by which this shall be done is where we divide. Some would accomplish the education of our profession by restricting the number of colleges; others by multiplying them. The genius of our people and country demands that all obstacles in the way of an easy acquisition of knowledge be removed, and that every man be assisted in every way to thoroughly illumine his intelligence.

Dr. T. C. Stellwagen. It is only by elevating ourselves that we can elevate the profession. He was glad that we had heard at this session none of that silly talk about elevating the public. We must put ourselves on so high a plane that we shall not be troubled about recognition. As to requiring an *English* education of intending students, it is too early to lay down such a line of demarkation. Some of our best men, who have been years in the profession, could not pass the examination. He contended that the examination of a man who has been in practice, as to his fitness for a degree, could not be properly done in the few minutes or few days allotted to it by the State boards. Would any of the gentlemen present be perfectly satisfied to sign a diploma of a man's fitness for practice after having him under observation for only a few days? If you would, you would open the door to a most dangerous possibility. It would be well if we could get a board so highly qualified and so well paid that they could afford to devote enough time to make a thorough examination of every candidate. As to placing the means of receiving an education in the reach of every man, he thought no school would shut out worthy men for the lack of money.

Dr. L. D. Shepard, Boston. The phrase used in the resolution was intended merely as an equivalent to a common-school education. There are now sixteen colleges, though one has ceased to exist through union with another, and one is not yet in working order. He favored the adoption of these resolutions, though they do not come up to his views. His ideal was higher, and the resolutions would go further if he had his way; but they are a compromise. But are they an advance? If they are, they should be voted. If they are not, amend them and put them up a peg higher. July 1, 1870, instead of 1875, was the original motion in the section, but the latter date had been substituted. If the association could insert the original date, he would wish they should do so. He has always favored the granting of diplomas to men who have been long in practice and have attained prominence, after one course. It would be a great mistake if the association did not take the stand that the colleges are not merely for graduating students, but for educating them, so as to qualify them to enter the profession by the proper door instead of coming in by the window. The third resolution expresses all that this body can do, namely, to exclude from representation those who do not come up to its requirements, but he regretted that we cannot go as far as he could wish.

Dr. R. Finley Hunt, Washington, had been connected with a college which took the ground that merit and skill alone should be the qualifications for the degree, without regard to the time consumed in acquiring them. It had placed its standard as high as it dared to do, as high as any of the others, and no one not qualified was granted a diploma. He thought this was the correct principle, and he could not vote for the second and third resolutions.

Dr. C. N. Peirce, Philadelphia, referring to the difficulties in the way of adopting any common standard of qualifications, stated that some time since he attended a meeting of the representatives of forty of the medical schools of the country, called for the special purpose of adopting such a standard. After two days spent in discussing the subject and perfecting resolutions embodying the ideas of the representatives, the vote on their final adoption was taken, and the resolutions were lost, the representative of one of the leading colleges stating that their work could not be binding on the schools, but would be merely advisory.

Dr. C. W. Spalding was aware of the result spoken of by Dr. Peirce, but we could not let them be a guide for us. We must mark out our own course. Suppose it does hurt the colleges? That is not a matter for this body to consider. The question is, Will the best interests of the profession at large be advanced?

Dr. F. H. Rehwinkel thought we should have no difficulty in coming to a conclusion. If anybody is called on to sustain the colleges it is this association. If we wish to impress the public that we are sending out educated men, he couldn't see why the students should not be examined as in a high school, as they advance, step by step. There is not a literary school in the land which does not require a preliminary examination, to ascertain if its students are fit to pursue the course laid down. As to the time of study and the granting of diplomas, the college examining boards should, if possible, be differently composed from the faculties. The diploma of a college carries with it an honor to the holder, and the college which grants it has a right to insist that a part, at least, of the time passed in acquiring it should be spent within its own walls. If you want less, simply grant a certificate of qualification to practice. No estimate as to qualification can be formed except after an extended examination; and examining boards, not having the opportunity for this, are apt to fall into a routine conduct of the examinations. He doesn't care how or where candidates acquire the necessary knowledge, so that they have it.

It is time also that we should do something to sustain the status of our dental colleges in foreign lands. Some months since he had met with a gentleman from London, who had been in reputable and successful practice in that city for some years, but who, in common with other graduates of American dental colleges, had been refused registration under the recent Dental Act now in force in Great Britain, because the registration board did not recognize the diplomas of such colleges. After commenting on the unfairness of this course toward men who were fully qualified to practice dentistry, and who had earned their title (D.D.S.) honestly, Dr. Rehwinkel read from the *Monthly Review of Dental Surgery*, of July 15, 1879, published in London, England, an advertisement of the "American University Dental College," Philadelphia, which, he said, everybody in this country knows is a miserable bogus concern. He had seen the original letters of a correspondence carried on with the dean of that institution by a gentleman, for the express purpose of obtaining indubitable evidence whether this institution did grant diplomas *in absentia*, as the process is known. Is it any wonder that they don't think much of the D.D.S. across the water, when they know that the degree can be obtained without attendance on lectures and without any of the knowledge requisite for practice? Yet this thing has been going on for years, to the disgust of reputable practitioners. In Germany the term "*Zahnarzt*" cannot be applied unless the one who uses it has earned it. A practitioner may write "dentist" after his name, or "American dentist," but he must not, without proper authority, so use "*Zahnarzt*." That is protected by stringent legal enactments. All this tends to lower the standing of American dental colleges in foreign countries. We all know that legally constituted dental colleges never do grant diplomas *in absentia*, and very few honorable practitioners have received the diploma, *hon. causa*. He also denounced the Livingston University, another bogus institution said to be situated in Haddonfield, New Jersey, which is also in the market with diplomas of M.D. and several other degrees. Our friend, Dr. Stockton, of New Jersey, certainly would know something about this institution if it was actually in existence and duly authorized to grant degrees.*

Dr. Taft moved the division of the resolutions, in order that each proposition might be voted on separately. Carried.

On motion of Dr. Shepard, after some attempt at amendment, the resolutions as reported by the section were adopted.

Adjourned.

NEW YORK ODONTOLOGICAL SOCIETY.

REGULAR meeting, held at the residence of Dr. William Jarvie, Jr., No. 152 Clinton Street, Brooklyn, on Tuesday evening, May 20, 1879.

The president, Dr. A. L. Northrop, in the chair.

INCIDENTS OF PRACTICE.

Dr. William Jarvie, Jr., Brooklyn. I present an article which I received the other day, intended for cutting or polishing proximate surfaces. It appears to be the best for that operation of anything I have seen. It is simply a strip of celluloid which has one side charged with corundum, and is similar in construction to the well-known corundum-and-celluloid discs. It is very thin, tough, and flexible, and cuts very well. It is manufactured by S. S. White.

Dr. A. L. Northrop, New York. I have used it, and like it very much.

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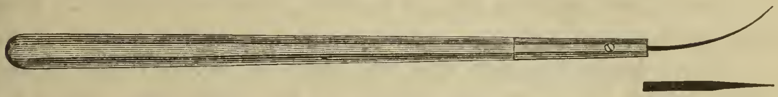
* Since the meeting of the Association, Dr. Rehwinkel has received from Dr. Stockton the following reply from the Secretary of State of New Jersey, concerning the existence and standing of the Livingston University:

"I have no knowledge, official or otherwise, of any such institution.

"HENRY C. KELSEY, *Secretary of State.*
"Per S. D. H."

The following paper on "Instruments for Detecting Decay in Teeth," by Dr. William Herbert Rollins, Boston, Mass., was then read by the secretary, Dr. Jarvie:



To detect decay in proximate surfaces the instrument must pass through the narrow spaces between the teeth. In most non-approximal cases it must pass through narrow fissures in the enamel.

Hence in most cases we need an instrument which will go into a narrow fissure.

There are two essentials in an examining instrument: a reason for its shape; strength.

Have the instruments for sale these essentials?

Looking at them, we find their cross-sections round or square. Let us suppose decay is beginning in a fissure whose dimensions at the surface are x by $5x$; x representing extreme tenuity. An instrument to go into this must have one dimension not greater than x.

If square or round, the area of its cross-section cannot be more than $x \times x$. X representing extreme tenuity, an instrument having a cross-section area $x \times x$ must be delicate.

As the fissure will admit one whose cross-section area is $x \times 5x$, the indication is to gain strength by increasing width.

Eighteen years ago Dr. Jacob L. Williams used a piece one inch long of a mainspring of a watch. This, fastened in a handle, was ground thin and narrow toward a point.

He kept the temper and bend of the spring.

When forced between the teeth the instrument is made straighter. If there is a cavity, the elasticity of the steel forces the point into it.

Pass it between the teeth first with its concavity forward, then backward. This will detect any defect in the surfaces touched.

I have changed the instrument by making the mainspring go through the handle.

It may be drawn out as the point wears.

A set-screw holds it.

Dr. William H. Atkinson, New York. I have a case to report to you which I described before to another society. It forms evidence that I am correct in refusing to extract teeth during an inflamed condition of the parts. Unfortunately, in this case, the tooth was extracted during periostitis. The second temporary and first permanent molars were extracted at one sitting, the pain then being very severe. I did not see the case at the time. The patient was a fairly-nourished boy, but living in a depressed condition through malarial influences. I saw him on a Monday morning. His face then exhibited, on the right side, a stony hardness, which extended down the neck to the axilla and mamma, and, on handling, was very painful. Five softish points were within a radius of an inch and a quarter from the inferior dental foramen, and one point not tender to the touch; through which I opened, and obtained a free discharge. After removing the stratum of good tissue, thick pus, and then a whey-like substance, and finally a cheesy material, came away. The opening was then washed out with a warm solution of salt in water, and then dried as well as possible; after which the chamber formed by the extraction of the teeth and the sac in the neck was filled with aromatic sulphuric acid, full strength. The next Sunday I again saw the patient, and left him in the hands of the gentleman who had called me in counsel, directing the chamber to be washed every day and dressed with wine of opium. Afterward, with a bastard-cut bur of about one-sixth inch diameter, I removed the corium of the bone through the opening first formed, cutting out until I had reached healthy, or nearly healthy, bone,—which occurred towards the margin of the foramen, near the plexus of vessels and nerves which issues thence. Last Sunday I dressed with aromatic sulphuric acid, not again using the bur. I am not certain as to whether another application of the acid will be needed. The only doubtful point is as to whether we have secured a sufficiently thorough removal of unnourished bone. I will confess that I left a considerable quantity of such bone. I am convinced that the treatment of necrosis by immediate removal of the necrosed portions is the only way in which to prevent spreading of the disease. The old method of allowing the trouble to exhaust itself, and then removing the sequestra, is bad practice.

Dr. Northrop. Dr. Atkinson is mistaken as to the simultaneous extraction of those teeth. About a week or ten days elapsed between the removal of the temporary and the permanent tooth.

Dr. Atkinson. I was told differently; but my information was, it seems, wrong on that point. I added to the external treatment named a prescription for internal use, containing two ounces each of aromatic sulphuric acid and glycerine, and one drachm of sulphate of cinchonidia, administered in teaspoonful doses, in water, morning and evening, and to be continued for thirty days. The acid acts well upon the liver. In my judgment it is preferable to mercury. The patient was only eight years old, and the dose recommended I considered as fit for a child. I know of no deleterious effects to occur from even larger doses.

Dr. J. W. Clowes, New York. Why was the extraction of those teeth recommended under the circumstances?

Dr. Atkinson. Two questions are always in view in such cases. Extraction of any of the temporary set may result in interfering with the succession of the permanent ones, or not. In the one case there is the risk of a crooked arrangement of the permanent set, and in the other the possible necessity of extracting all four first molars. On the other hand, if extraction is performed during periostitis, there is always the liability to necrosis following, from want of free circulation. I may say necrosis always occurs under such circumstances in persons of slow chylopoietic system. The first question is mechanico-physiological, having reference to development, while the second is pathological.

Dr. C. E. Francis, New York. Will Dr. Atkinson state whether necrosis existed before the extraction, or was caused by that operation, or whether there was a fracture?

Dr. Atkinson. Extraction, pure and simple, never causes the trouble at all, unless there be a fracture; and even then extraction is only a secondary cause. In this case, inflammation undoubtedly was present before extraction; but necrosis need not have occurred if the teeth had not been extracted. I had another case, in which, a pulp being destroyed and the pain not ceasing, the tooth was extracted. In that case there was also malarial poisoning, with some fracture of the process, which extended the mischief. Whatever cuts off the circulation is the cause of necrosis of any tissue. When we say "necrosis," we may imagine we are talking of *dead* bone, but really we are talking of *the death* of bone. Bone dies through cutting off of the nutrition of its corpuscles, the lime-salts not dying but being simply dissolved. Therefore it is easy to see that whatever cuts off the circulation from the living portions of bone will cause necrosis, which is simply a retrogressive metamorphosis of its corpuscles.

Dr. Jarvie. I would like to know why it is wrong to extract a tooth during periosteal inflammation.

Dr. Atkinson. Because in doing so you cut off the circulatory supply. Where inflammation exists there is always a stoppage of circulation. And when we say that, we must not think of blood alone. All the nutrition of bone is not from red blood alone. It is also from the colorless pabulum existent in what used to be called cellular tissue.

Dr. Jarvie. Through the pulp, or through the periosteum?

Dr. Atkinson. Wherever infiltration has taken place. I have seen it so extended as to involve the entire shaft of a long bone. Surgeons claim it is not right to cut until a line of demarkation is well established; the president will appreciate the fallacy of such doctrine, for he saw that the breaking down of that stony hardness occurred only twenty-four hours before I saw it. That hardness was simply infiltration of lymph in the interstices in the connective tissue. Its breaking down is called "abscess" in soft tissues, where it occurs much more rapidly than in hard tissues; and the tissues are always dense where there is periosteum.

Dr. Northrop. Supposing periosteal inflammation has begun at the end of a root, would you advise going through the gum and bone to relieve it?

Dr. Atkinson. Cut completely around until you have entered healthy territory beyond that originally involved. I am acting thus every week.

Dr. Northrop. If the tooth, without cutting, were so extracted as not to involve any fracture of the bone at that part, would not relief occur as certainly as by cutting?

Dr. Atkinson. The cutting through at the root would be much less liable to cause mischief, since it leaves intact all the process except at the point of the root; and as to the pulp, in almost all cases that will be found already dead. The only part of the operation causing pain is the entrance through the gum.

Dr. O. E. Houghton, Brooklyn. Is the bur better than the drill?

Dr. Atkinson. Yes; especially a bastard-cut bur,—double-cut. The drill might be used first and followed by the bur. The first cut should be made with the lancet. Sometimes I have dispensed with dressings, leaving the blood and débris *in situ*, and obtaining union by first intention. To those who would try my method I would say,—wash with salt and water, dry, and sop with a solution of twenty grains of chloride of zinc to the ounce of water; after which apply a dressing of tannin and glycerin externally. This course will procure union by first intention.

Dr. Houghton. Suppose a case of periostitis of the whole root, where one has no desire to save the tooth.

Dr. Atkinson. I have no such cases. Have you?

Dr. Houghton. I thought I had.

Dr. Atkinson. I have no cases where I do not desire to save the teeth. To instance this in another manner, I retain roots under artificial dentures. Why? Because nature has put those roots there for a purpose. If I suspected much liability to periostitis, I would do as ninety-nine out of every one hundred of you do,—extract them. My best success in artificial dentures has been where I preserved the roots and allowed the plate to rest upon them. The wickedness of extracting teeth has never, it seems, been thought of. I have a case where the first and second upper molars on both sides were extracted upon the advice of an excellent artificial workman. The result is that I have taken several impressions within six months, because the mouth kept on shrinking. If I had had those back teeth to which to attach the others, the case would long ago have been made satisfactory, and the retention of those teeth would have secured the proper nutrition of the parts, and would also have enabled the patient to chew properly.

Dr. Jarvie. I have had a couple of cases recently, the relation of which may be of benefit to some one, and perhaps throw a little light upon an obscure cause. The first case was that of a lady, the wife of a physician, who sent for me a few weeks ago, and who has been suffering with facial neuralgia for two weeks. She had been under treatment by her husband, who finally called in one or two of his professional brethren, but all remedies seemed to have no effect. Occasionally relief would be afforded, but only for a short time. On asking her the symptoms to see if I could connect any tooth with the pain, I learned that there was no sensation whatever on closing the teeth together, no pain in any of the teeth, and nothing whatever to indicate that the teeth were the cause of the disturbance. I knew that some three years before I had capped a pulp in a superior second bicuspid, and covered the cap with a gutta-percha filling. I removed that filling and cap, and in two or three minutes afterward the neuralgia had disappeared.

I found the pulp partially devitalized, and a little pus in the pulp-chamber. I treated with creasote at the time, and the next day applied arsenic to destroy what little vitality remained. Since then I have removed the pulp and filled the tooth.

The other was a child fourteen years of age, who had been suffering for some time with excruciating pain in his face. The pain not yielding to any of the usual remedies, his physician brought the boy to me, and on removing the filling from an upper molar I found a pulp congested. The pain in the face was intense while I was removing the filling, but in the course of half an hour it subsided entirely. The treatment I pursued was exactly similar to the foregoing case, and with equally good result.

Dr. Houghton. I would like to ask Dr. Atkinson if he would not *extract teeth* under the circumstances under which I did to-day. A young lady twenty-three years of age, in rather delicate health, came to me for relief. She had been unable to masticate for the past two or three years, and but a little at any period of her life, and had therefore been obliged to live on "spoon victuals" most of the time. On examination, I found a very large and protruding lower jaw, with large teeth, of which the incisors and bicuspids were in good condition, the molars badly decayed. The upper jaw was very much contracted, with incisors and bicuspids in fair condition, several of which had been filled some years before. The molars were badly decayed, nothing but roots remaining. The cutting-edges of the superior incisors set back of the lower incisors fully half an inch. In fact, she was unable to bite my index-finger when inserted between the front teeth. The only points of articulation in her mouth were at the rami and a portion of one or two roots of the second molars, which latter were badly diseased and filled with a fungous growth, which made it quite painful for her to bite at all. In my opinion the only way to give her relief, and the best course to pursue under these circumstances, was to extract *all* of her superior teeth and roots, some thirteen in number (which I did), and resort to an artificial denture.

The following paper, entitled "A Contribution to the Knowledge of Cements," by Dr. William Herbert Rollins, Boston, Mass., was then read by the secretary:

Since 1872 I have tried to find a cement for filling teeth. To avoid loss in rediscovery I have analyzed the cements in the market, finding them oxychlorides of zinc. It has been amusing to see each new cement praised while old ones like it were given up. I have analyzed two cements which have recently been placed in the market. Their resemblance may possibly show another case of independent discovery in different countries.

ANALYSIS.

Fletcher's.		*Weston's.*	
Fluid.	Solid.	Fluid.	Solid.
Phosphoric acid. Phosphate of alumina.	Basic oxide of zinc.	Phosphoric acid.	Basic oxide of zinc, 80 per cent. Silicate of alumina, 20 per cent.

The silicate of alumina in Weston's cement is inert. The two cements are less irritant than oxychloride of zinc. They adhere firmly to the tooth. They will not last. Orists will find them cheap and easy to make, a pound not costing much more than is now paid for an ounce. If you buy phosphoric acid, test it. Twenty per centum of sodium phosphate is often found in the glacial.

Directions for making a phosphate cement: Concentrate pure phosphoric acid till semi-solid; mix aluminum phosphate with it by heating. For use, mix with basic oxide of zinc to the consistency of putty. The light oxide of zinc should not be used here, nor in making oxychlorides. The cement sets in two minutes.

Phosphate cements are not new. See patent No. 159,568, February 9, 1875. As the patent-office rules that the first inventor may claim a principle broadly, I do not think these cements of Fletcher and Weston can be patented in America.

This patent could probably be bought, for the inventor seems not to have brought his cement into the market.

In covering thin dentine over a pulp we have needed a non-irritant, strong cement, which, though mixed thin, would harden quickly.

By calcining magnesium nitrate an oxide is made. This, when hydrated, forms a durable cement. When mixed with phosphoric acid it hardens at once, growing so hot as to burn the hand. As basic oxide of zinc forms with phosphoric acid a slower-setting cement, the indication is plain. I have used for pulp-capping and temporary filling the following mixture:

Basic oxide of zinc, 2 parts;
Oxide of magnesium, 5 parts.

Grind them together. For use, mix to a paste with syrupy phosphoric acid. This sets in thirty seconds. I still believe the future filling will be a cement; these are but transitory.

Discussion.

Dr. Jarvie. I have worked some of Fletcher's cement, and it seems to act very nicely,—more like softened gutta-percha than anything else I have used.

Dr. Atkinson. I have a case, which I polished to-day, that was inserted about six weeks ago, flush with the edges of the cavity, for the purpose of seeing if there was any waste. The fillings were on the anterior proximate face of a left superior bicuspid and the face of the lateral incisor, with exactly similar cavities on the right side, and all the labial faces at the margin of the gum of the cuspids and incisors. I used a flat disk to get it down, and found it was so hard that the disk did not cut fast enough to satisfy me; upon which I used a corundum disk and polished it down so as to get a very smooth surface, not going to the level of the enamel, because intending to wait another month to see if there would be any waste. I ran my finger-nail over it, and found I was still stopped at the edge of the filling. That was the material called Weston's Insoluble Cement. I don't see one particle of evidence, by my closest inspection, of any shrinking.

Dr. Jarvie. It is a phosphate?

Dr. Atkinson. Yes, sir.

Dr. A. H. Brockway, Brooklyn. I regret that Dr. Rollins has not given his reasons for supposing this cement would not prove lasting. The cement which he describes is composed of oxide of zinc and phosphoric acid. Weston's Insoluble Cement, Fletcher's Porcelain, and Poulson's Nerve Plombe, are of that kind. They are different from the oxychlorides, and it seems to me they produce far better results. I have been using Poulson's Plombe with very satisfactory results. Of course it takes time to test these things, but I have had a statement from Dr. Flagg, and also from Dr. Arthur, that they have used this material for nearly two years. Dr. Arthur said it had given him very great satisfaction, and Dr. Flagg spoke equally highly of it. I don't know that we can expect everything from this that we desire, but I believe we have in it a far better article than we ever had before. I would say that I saw in Philadelphia last winter a filling that Dr. Flagg had put in, if I remember rightly, some five months before. It was on an articulating surface, and was as hard as stone, showing not the slightest wear. My impression was that the filling would last for years. I speak of Poulson's.

Dr. W. A. Bronson, New York. I have been experimenting with these cements for the past six or eight weeks, and believe I have yet to see a failure in any one of the three,—Fletcher's, Weston's, and Poulson's. Fletcher's, with which I began, works lightly under the instrument. The first bottle of Weston's which I procured worked similarly to Fletcher's, with about the same results as to durability. More lately I procured Poulson's, which has seemed to me to be better than the others, especially in the quality and fineness of the basic powder. It seems to make a smoother and more dense filling than the others. Liking it so much more than Fletcher's, I attempted, the other day, to remove a filling of the latter from a large crown cavity, in order to substitute Poulson's; but, after working at it until I was tired, and dulling all my instruments, I gave up the task, and replaced what I had been able to remove with Poulson's.

Dr. O. E. Hill, Brooklyn. Considering only the working qualities, which would you prefer of the three?

Dr. Bronson. I would prefer Poulson's.

Dr. Brockway. My experience with Fletcher's and Poulson's cements is the same as Dr. Bronson's. Poulson's is as sticky as Fletcher's; but a little experience enables one to handle it very easily. It exhibits, when finished, a much finer surface than Fletcher's.

The following paper, entitled "Some Notes on the New Departure," by S. P. Cutler, M.D., LL.D., Memphis, Tenn., was then read by the secretary:

In the April and May numbers, '78, of the *American Journal of Dental Science*, a series of articles appears under the above heading.

These papers are "bold" and intrepid, just such papers as we like to see. Just such papers break down the gold barriers, the "*bulls* and *bears*" in the profession, that have so long deterred the more timid from exercising their better judgments. The world moves on; so does man; so does dentistry, "boldly and fearlessly."

For a man who is acknowledged as authority in the profession to boldly take a stand in any new departure gives confidence and assurance to the more timid: they need help.

The writer under consideration cannot claim originality in announcing the *so-called* "*new departure*" by any means, though he arrogates as much.

The "*new departure*," *so called*, may be said to have originated at a called meeting of the New York Odontological Society, on December 14, 1874, at which time there were four papers read on the subject of amalgams, and one on gold fillings.

These papers contained elaborate experiments and tests of the physical and chemical properties of amalgams, and their advantages in dental practice.

They were ably discussed by members present, and a revolution in favor of the material may be said to have then commenced. It was there claimed that amalgam was equal to gold, and in many instances preferable. This was the dawn of the new era in dental operations.

The premises upon which the writer referred to bases his conclusions may be regarded as quite questionable, if not untenable, in part if not in whole; that is, the galvanic or magnetic theory, as given by another writer.

It is claimed by this theory that a galvanic current is established between the filling material and the tooth-bone, in consequence of acids in the mouth; that these currents act as prime factors in decay around fillings in teeth; the potential equivalents, or values, of each filling material are given.

Now, I think it can be conclusively shown that an effect has been claimed as a cause, whether the theory be correct or not.

The position assumed is that a weak battery is formed, as above stated, which causes decay or disintegration of the tooth.

Before any galvanic action can take place in any battery, there must be chemical action, or molecular disturbance, by oxidation of some element of the battery, which evolves a current of galvanism proportional to chemical disturbance.

In this chemical action, both heat and magnetism are involved; if the disturbance is too energetic, more heat than magnetism may be set free, depending on elemental construction of the battery, proportion of oxidizing surface to nature and size of conductors, and strength of solution used. There is no current preceding chemical change. When a tooth decays there is molecular disturbance, but not necessarily an oxidation. In fact, there is no oxidation concerned in decay of teeth. Let us see. The earthy elements of teeth and bones of animals are composed of triple phosphate of lime mainly; when any acid "comes in contact with teeth and bones, containing hydrogen as one of its elements," new affinities are brought to bear in this way. Any such acid has a stronger affinity for the lime of teeth and bones than the phosphoric acid with which the lime is combined in teeth and bones. In consequence of this stronger affinity, a partial decomposition of the tooth or bone takes place in this way. One of the three equivalents of lime forming the tri-basic phosphate, having a stronger attachment for the new acid present than for the phosphoric acid, this one equivalent consents to leave its old friend, phosphoric acid, and goes off with this new acquaintance to form a proto-salt of the new acid.

Now the old family alliance is broken up, and lime washed away, as the lime left in company with the phosphoric acid becomes a soluble salt (bi-basic salt of phosphoric acid), which is soluble in water, and is washed out by the saliva of the mouth.

In this way the teeth may be said to decay.

In this process I can see no oxidation going on to form currents.

The hydrogen acids in the mouth cause decay of teeth, as above explained, as I understand the subject. There is molecular disturbance in decay of teeth, but we can find no oxidation; and if there are any magnetic currents they certainly cannot anticipate the acid action, hence must be viewed as sequence of molecular disturbance, not a cause.

The stronger the acid reaction of the mouth, "as a matter of course," the more rapid will be the decay, other things equal. Whether the decay is going on around a plug, or where there are no plugs, there can be no difference in cause; what causes the one causes the other. There can be no difference of opinion on this point. Deep fissures and proximate contact are the points most vulnerable to the ravages of decay, where food and saliva undergo fermentation and decomposition. Acetic acid being one of the chief resultants of this process, decay begins and progresses there. In these instances there certainly are no conditions sufficient to establish galvanic batteries. Some magnetism is evolved, no doubt, though not appreciable. Heat is evolved. There can be no difference between these decays and decays taking place by the side of leaky plugs. Rapidity of decay in both, *other things equal*, must be about the same, battery or no battery. Gold plugs, or any other plugs, the difference cannot amount to much. Amalgam has a preserving agency, probably, that other filling materials do not possess. The oxide of silver of an amalgam filling, I believe, has a tendency to harden the dentine, by plugging up the tubuli with an insoluble oxide that keeps out fluids with their acids, thereby rendering the dentine impervious. The porosity of decaying dentine greatly favors the process of decay by capillary attraction, which invites the fluids into the tubuli, more especially the acid secretions or fluids of the mouth, owing to affinities already mentioned above.

As to amalgam as a filling material, it is well known that it is as durable as anything else, and may be used successfully where gold could not be manipulated, and in frail teeth that would not bear the necessary amount of pressure to make a water-tight gold filling. In consequence of these facts amalgam is capable of saving more teeth than gold, though in a large majority of cases gold properly inserted will preserve equally as long as amalgam; I will not say longer.

The main reason why gold fails oftener is no doubt owing to imperfect manipulation, as it is the most difficult of all filling materials with which to make a water-tight and perfect filling.

In very large contour fillings, where the tooth is thin and frail around the filling, the expansion and contraction of the gold by sudden changes in oral temperatures may have something to do with leakage.

The amount of galvanism evolved from the decay of a tooth, the time ranging from one month to twelve months, if any be evolved, if concentrated into one hour's time, if it could be utilized, would not amount to enough force to decompose one drop of water. This galvanic bubble might as well be exploded and the galvanism let out when nobody will be hurt.

It may be argued by some that this amalgam adoption will tend to lower and degrade the status of operative dentistry, similar to that of rubber in the mechanical department; this may be so, or may not be so. What dentist, at this day and time, would go back to gold plates and give up rubber and celluloid? "Echo says, Who?" Do we consider the gold plate preferable to the new departure in the laboratory? "Certainly not."

It may be said that plastic fillings will cheapen dental operations. So they may, but the community will be the gainers. The amount of filling done (like rubber work) will be proportionately greater, and prices will be remunerative.

The exorbitant prices charged by some are all wrong and unjust; value received is not given, as there is no extraordinary skill exercised that numerous other operators are not capable of.

Communities believe themselves swindled oftentimes, as they undoubtedly are. There is not "live and let live" enough exercised. There is, of course, danger of more charlatanism getting into our profession, should gold be wholly, or even partially abandoned in filling teeth; but the inevitable may be regarded as one of the fixed laws and must prevail, and we might as well take an optimistic view of the case and make the best of it.

One great good must certainly result, and that is, that a vastly greater number of teeth will be filled and saved than under the present system; fewer teeth will be sacrificed and fewer plates worn than at present, which latter fact is a lamentable circumstance and a stigma on the profession.

Our amalgams are not yet perfected, our bone-filling material is not yet perfected, neither is the use of either generally as well understood as that of gold by the average dentist.

Much has to be learned yet before the fullest success can follow. Really no less skill is demanded in the use of amalgam than in that of gold. To the comfort of the patient the difference is truly great, which will be a strong argument in its favor. Time saved will be of importance to all parties.

Discussion.

Dr. W. B. Hurd, Brooklyn. It seems to me that there is at least one contradiction in the paper just read. It is first stated that gold does not generally save teeth, because it requires more skill for its proper use than is generally possessed; and it is afterward held that amalgam requires for its most successful use as much skill in manipulation as gold. Then in what circumstance is the more general value of amalgam to be found? My observation, as well as that which was taught me, tells me that gold, properly employed, has no superior as a material for tooth-filling. The failures in gold should not be used against it as a material, but should be laid to where they properly belong,—want of skill in the persons who have so used it as to make the failures. Failures with *any* material will be the certain result of incompetent use. But the real secret of the movement, as it appears to me, lies in the fact that patients demand excellent work for miserable prices; which demand cannot well be complied with where gold is used. This is disgraceful to our younger men, who now receive such schooling as the best of their professional ancestors never knew. I can readily imagine that an *old* man would desire a material which would suit his clumsy fingers, and might hail the plastic cements as such a desideratum; but the young man should not have such ideas, especially after such training as our modern schools and colleges give him. The plastic fillers are mere masons. I can find you men who have had almost no dental experience, who can fill with amalgam about as well as I can; but this is not the skill of a trained professional man. It is simply the art of masonry refined.

Dr. Atkinson. A man who has never had the ability to insert a respectable gold filling, and who has not sufficient anatomical and physiological knowledge to discriminate between a diseased and a healthy tooth, may resort to plastic fillings. But I never knew a man to backslide in that way who had gained the skill to prepare and fill a tooth with gold in such a manner as to redeem it. I think Dr. Hurd touched a key-note when he mentioned the prevailing disposition of patients and operators toward good work at miserable prices. But, oh, gold fillers! fear not because of this. There is plenty of calico, and yet silks and satins are also in demand. Those who are able to pay for the best work are now, and always will be, plenty, and will surely have the work for themselves and their children, and will pay cheerfully and thankfully for it. I know the author of this paper well. I know his idea with regard to the triple and bi-basic phosphates of lime. I know he has been so isolated from men who had anything near his natural talent and industry that he has been run to one side. He has not been supported by the experience and observation of older men, so that we cannot rely much upon what he says. But close inspection of his remarks shows that each mischievous utterance carries its antidote with it. In fact, every sentence read to us, that is not a simple dogmatic statement, contains the cure for its own virus. I am not opposed to new things so long as they are good things. If a material shall be found which shall combine in itself the qualities to arrest decay, restore contour, harmonize in appearance with and save the tooth, I shall hail it. But have we any plastic filling which will even approach gold in all these particulars? The case I referred to to-night, of Weston's cement, is one in point. The lack of color and want of semi-transparency is very objectionable. But why need we search for *easy* things? The multiplication of appliances and materials has made it possible to do now in one day what once we could not have done in six. And then, if you never get a cent for good work you are still paid. How? By the blessed consciousness of having done a real service,—*a* REAL *service*,—such as *ought to be* common, and *will be* common before long. For *good* will soon be the *rule* and *mischief* the *accident*,—exactly the opposite of the present state of things.

Dr. J. W. Clowes, New York. Mr. President, I am very much pleased to hear these veterans of the profession talking so nobly to the point. Our friend Hurd has uttered some important truths. There *is* nothing better than gold as a filling; but to be *excellent* it must be used in an *excellent way.* I assert that a man who does not know how to employ gold in this manner has no business to be a dentist, and certainly lacks the capacity to use plastic materials. Let him first become an adept in the use of gold; then the ability to work in a *saving* way with amalgam, gutta-percha, os artificiel, and other good things will be "added unto him." Show me a skillful manipulator of gold, and I will not doubt him for the rest. I notice a very singular quality of late *cropping out* in this profession. From one extreme of the country to the other, dentists are talking about doing work in a *cheap* way. They have such a great regard for the public that they desire to do the best service for the *smallest* pay. They are so saturated with the milk of human kindness that their chief delight in preserving teeth is not so much in the *act*, as in the fact that they receive but little for it. If they save by separating, they do it because it is cheap. If by plastic materials, it is because they are cheap. The great end and aim of their supremest effort is to become cheap-jacks and belittle their calling. What a miserable and undignified condition of things this is! Are we indeed a profession?—and if so, are we not entitled to a fair remuneration for our services, and something beyond this, for a "wet day and time of need?" Shall we charge so much for the materials used, so much per day or hour for our work? Is that all it has come to, these fifty years of effort, heroic struggle, and mental strain? Are we indeed but day laborers still? *God forbid that even one man among us should be so recreant as now to suppose it!* Do the legal, the medical, the surgical professions charge for their services by the hour? Do they din "cheap, cheap" into your ears? No, sir; they *are* professions, and every true man in their ranks, while faithful to his charge, maintains their dignity and by right *sustains* himself. It is not enough that we should eke out a bare subsistence,—a prolongation of life with a continuance and certainty of toil. We *are* a *grand* profession, and are entitled to our rewards. We must cultivate this view of the subject, and while we do our "level best" for our patients, must be careful not to belittle in our own minds what we have done, by a *timidity* that acts the coward. *Our operations will be esteemed and valued according as we value them ourselves.* The public are quick to perceive whether we are *dolts* or men. True manhood will give us exaltation, and in its "stir" will come the exaltation of our loved profession.

Dr. John B. Rich, New York. Mr. President, it ought to be the aim of every intelligent professional man to use every means in his power to carry out the fundamental principles of his profession. One of the fundamental doctrines of this profession is to preserve the teeth in the best manner possible. At the time I entered the ranks of this profession it was held to be good doctrine, and was boldly and positively expressed as such by most of its eminent members, that gold and tin were the only proper substances with which the cavities produced by decay ought to be filled, and that teeth that could not be filled with those substances ought to be extracted; that none but disreputable men would employ amalgam as a material for filling teeth; that its use for that purpose was an abomination, as it was poisonous, and would not preserve the teeth. I accepted these doctrines taught by my elders as true, and adopted them as part of my professional creed. And no one advocated the exclusive use of gold and tin more strenuously and sincerely than I did at that time; but I have lived to know that there are other substances that will, under certain circumstances, preserve the teeth when gold will not. I have failed with gold where I had taken all the pains of which I was capable, and used all the skill that I possessed; and when gold failed to preserve them I have succeeded in saving the same teeth with amalgam.

There was an assertion made here to-night which I wish to indorse most heartily. I do not remember the exact words, but it was to the effect "That no one, unless skilled in constructing fillings of gold by pressure, can make good fillings with plastic substances." In making amalgam fillings I have to employ as large an amount of skill, labor, and time as if I was forming the filling of gold.

Dr. Brockway. You would not say that of large gold fillings?

Dr. Rich. I would say that of any sized filling formed in the manner that I use amalgam. In large amalgam fillings there is a very much greater proportionate amount of care and labor required than in small or medium-sized ones; of course, this depends upon the mode of using this material. The process I employ is one that requires time. I will briefly describe it. I mix two parts by weight of mercury with twelve parts of Fletcher's platinum and gold alloy; these, when thoroughly combined, form a powder, which is placed in the cavity in small quantities, and each portion is packed and burnished down hard before another portion is introduced; and, although this method requires time, it produces better results than any other I know of. It has been said here this evening that we are all abroad as regards the use and value of plastic substances. Now I deny that assertion. So far from being abroad as regards them, we have a large amount of certain knowledge about them, and the advance made in their preparation and use within the last forty years is very great. Take amalgam as an example. How was it prepared and used then Now listen while I describe the only mode then known. The dentist would procure a Spanish coin, generally a Spanish pillar dollar. He would rasp off some of it with any file that happened to be nearest at hand. He would take those filings, without having attempted to remove the particles of the file which had been broken off in the process of filing, and mix them in the palm of his hand with as much mercury as might be necessary to make the whole into a paste. He would then remove the more fluid portion of the mass, which he thought was surplus mercury, by squeezing it in a piece of buckskin or a napkin, and without any further preparation he would introduce it into the cavity with as little pressure as possible, smooth it off, and it was done. The whole process of putting it into the cavity would not occupy more than two or three minutes. Now who will pretend to say that we have not made progress in the preparation and use of amalgam? And so it is with other plastic substances that are being used as fillings for the teeth. The improvement in their preparation and use is steadily progressing, and their usefulness is demonstrated every day. Therefore let us be wise in our generation, and neither reject nor denounce anything which gives promise of usefulness in saving decayed teeth until all the experiments possible to determine its value have been made.

In relation to the insecurity of large gold fillings on account of the variations in their proportions produced by changes in their temperature. This is a subject worthy of the most careful investigation, and ought to command the earnest attention of every member of our profession. Where a large mass of gold is introduced into a large cavity it must, when it is subjected to changes of temperature, produce a tremendous strain upon the walls of the cavity; and there can be no doubt that the large number of failures in large gold fillings is the result of injuries to the walls, produced by the expansion of the gold.

It will be a great result accomplished and an inestimable boon to the dentist when a substance is produced which, while it combines all the qualities necessary for a good, durable, and sightly filling, will not be subject to change of volume by changes in its temperature.

Dr. C. E. Francis, New York. While I consider that in all ordinary cases gold is the best stopping material that can be used, yet I believe in "conservative practice." I have seen gold fillings that have done good service for many years, and have also seen stoppings of other material that have done equally good service. Only yesterday I saw in a gentleman's mouth a very large contour tin filling in a superior bicuspid, which was introduced by Dr. Riggs, of Hartford, some twenty years ago. It is still in good condition, and bids fair to remain so for a long time. Other teeth in the same mouth have given out, but this stands as a monument to dental skill.

Within a week I have seen several amalgam fillings put in by Dr. Clowes, I think, some twenty-five years ago, which appear to be as perfect to-day as if recently done.

Some two years ago I was called upon by a physician to see a lady who, he said, was suffering with acute neuralgia, and he desired me to ascertain, if possible, the cause of it. The lady was on the eve of confinement. I found her in great agony and suffering severe pain in her face and head, but could not locate it. The physician directed my attention to an amalgam filling in a superior third molar put in by Dr. Hurd some fifteen years ago. The physician thought the pain might be occasioned by that tooth, although it seemed in excellent condition, and gave no evidence of local disturbance. As he was prejudiced against amalgam, he felt positive that this was the source of the trouble, and as he was persistent in having it removed, and the patient consenting, I removed it to gratify them. The dentine beneath the stopping was sound and healthy, and I filled it with gutta-percha. It had no effect, either to modify or aggravate the pain, but the next day the patient was confined and the neuralgia all disappeared. So much for plastic stoppings.

In regard to tin foil, Dr. Lord reported a case where a patient exhibited a tin filling which had been put in a tooth some sixty years previously, and was still in fair condition.

Recently I had a visit from an old patient who now resides in Edinburgh, for whom I introduced a tin-foil stopping in a superior molar some twenty-five years ago, which he terms his "memorial filling." He said he called on me at that time to have the tooth extracted, as it was causing him pain, but that I persuaded him to have it treated and filled, stating that it might be useful for two or three years longer. It has served him well for over a quarter of a century, and bids fair to last many years longer.

Adjourned.

ODONTOLOGICAL CLUB OF PHILADELPHIA.

THE second annual meeting of the Odontological Club of Philadelphia was held July 1, 1879, at 8 P.M. The following officers were elected for the ensuing year:

Moderator.—Dr. Jos. R. C. Ward.

Vice-Moderator.—Dr. H. K. Leech.

Secretary and Treasurer.—Dr. L. Ashley Faught.

L. ASHLEY FAUGHT,
Secretary and Treasurer.

CONNECTICUT VALLEY DENTAL SOCIETY.

THE annual meeting of the Connecticut Valley Dental Society for 1879 will be held at the Haynes House, Springfield, Mass., October 16 and 17.

C. T. STOCKWELL, *Secretary.*

LICENTIATES IN DENTAL SURGERY.

THE following is a complete list of the Licentiates in Dental Surgery of the Royal College of Surgeons in Ireland up to August, 1879. The next examination will be held October 20.

The list includes nine who hold the degree D.D.S.

Amore, Duncan Wrightson, Hastings.
Albert, James Valek, London.
Ayres, Edward, London.
Alder, Charles, Liverpool.
Ash, Edward Thomas, Brighton.
Albert, John Gabriel, London.
Bradshaw, Richard, London.
Benham, George Augustus C., Leeds.
Bloom, Mark J., Dublin.
Balcomb, Thomas, St. Helier, Jersey.
Bayfield, Charles Moulden, London.
Brown, James, Manchester.
Bacon, William Braddell, Tunbridge Wells.
Brindley, Frederick Walhi, Sheffield.
Beavis, George, Newport, Monmouth.
Batchelor, Frederick Robert, Birmingham.

Bates, William, Macclesfield.
Coker, Thomas Vesey, Bristol.
Crowther, George Henry, Wakefield.
Councell, Edward Arthur, Bristol.
Clarke, Jr., Isaiah William, Bristol.
Canton, Walter Charles, London.
Church, Dawson, Dublin.
Cronin, Augustus, London.
Coles, Robert Stratton, Plymouth.
Castellote, Bonaventura, London.
Crapper, John Sugden, Hanley.
Conrath, Frederick William, London.
Chapman, William Wilton, Armagh
Dreschfeld, Seagould, Manchester.
Dally, Frederick, D.D.S., Wolverhampton.
Dainty, John, Utbridge, Middlesex.
Durandu, John Edward, Liverpool.
Dew, E. T., Weston Super-Mare.
Dopson, Daniel, Liverpool.
Douglas, Edward Caush, Brighton.
Dagnell, George Clement, London.
Dilcock, Thomas, Liverpool.
Egan, Louis John, Cork.
Faulkner, John, London.
Farnsworth, C., Manchester.
Foran, John Cyril, Eastbourne, Sussex.
Fitzgerald, John Jarret, London.
Goepel, John Robert, Liverpool.
Grey, Edward James, Cheltenham.
Gabell, Alverston, Surrey.
Gregory, E. J., Cheltenham.
Headridge, William, Manchester.
Hooton, Jonathan, Manchester.
Hayman, Charles Augustine, Bristol.
Hayman, Samuel John, Clifton.
Hunt, Frank Alexander, Manchester.
Hinton, Frederick William, Clifton.
Hockley, Anthony George, London.
Headridge, Peter, Manchester.
Hartley, William, Southport.
Hayman, Alfred George, Clifton.
Helgan, Henry, Haversford, Wales.
Harding, Walter Paxton, Carnarvon.
Helgar, William, Bristol.
Hamilton, John, London.
Hayman, Herbert, Clifton.
Hatton, Frederick James, Bristol.
Harrison, Joseph, Sheffield.
Halliday, Harold, London.
Jonston, Michael, Chester.
Kelly, Thomas Mark, Manchester.
Kelly, William, Manchester.
King, Charles Normon, Exeter.
King, Henry Augustus, Manchester.
King, Roff, Shrewsbury.
Knott, Edward Henry, D.D.S., Brighton.
Kekwick, John Fergus, Rugby.
Laurence, Herbert Arthur, London.
Little, Edward, Bristol.
Longford, John Henry, Dublin.
Levason, Arthur Grenville, Hereford.
Limbert, Edward Harvey, London.
Lloyd, Thomas Isaac, Preston.
Laws, John, Weymouth.
Moxon, Henry James, London.
Moore, John Hamilton, Paris.
Mahonie, Thomas, Sheffield.
Murphy, Thomas, Bolton.
Masters, John, Manchester.
Molloy, John Henry, Manchester.
Machin, Launcelot, Worcester.
Mallin, George Prescott, Bayswater.
Morrison, Robert Paul, Barnstaple, Devon.
M'Burney, John S. B., Douglas, Isle of Man.
M'Owen, William, Blackburn.
Newman, William John, Liverpool.
Nottingham, James Frederick, London.
O'Duffy, John, Dublin.
O'Hara, William James, Leicester.
Pierrepont, Evelyn, Manchester.
Parson, William Murray, Bristol.
Palmer, John Ender, Gosport.
Planck, Henry, Manchester.
Pritchard, John Walter, D.D.S., London.
Parson, Thomas C., M.R.C.S., Bristol.
Partridge, Henry Francis, London.
Penfold, William, London.
Pallant, Arthur, Maidenhead.
Perkins, Jacob H., Taunton.
Rogers, Richard, Cheltenham.
Redman, Joseph Henry, D.D.S., Brighton.
Roberts, John George, Liverpool.
Renshaw, Isaac, Rochdale.
Richardson, Francis, Derby.
Rooke, James Henry, London.
Robinson, Frank, Blackheath.
Rutherford, Charles Frederick, London.
Shiels, William James, Cork.
Smith, Alfred, Bristol.
Saunders, Walter, D.D.S., Ramsgate, Kent.
Street, George Haywood, Richmond.
Shillcock, Joseph William, London.
Smith, Charles, Manchester.
Springfield, William, Lowestoft.
Saunders, Joseph Henry, Bangor, N. Wales.
Stoner, John Nathan, Brighton.
Stokes, Charles Henry, Montevideo.
Shillcock, Edwin, London.
Sumerling, Arthur, Leek, Staffe.
Tamsworth, Charles, Manchester.
Trissell, Edward, Weston Super-Mare.
Taylor, Frederick St. Barbe, Dublin.
Visick, Arthur Baxter, D.D.S., London.
Verrier, Arthur Buet, Weymouth.
Vanderpart, Francis John, Kingston-on-Thames.
Waite, William Henry, D.D.S., Liverpool.

Wedgwood, Joseph James, D.D.S., London.
Wormald, Sidney, Stockport.
Williams, Edward Henry, Manchester.
Wilson, John Addison, Bangor, N. Wales.
Wormald, Thomas, East Oldham.
Wells, John, Berwick-on-Tweed.
Wormald, David A., D.D.S., Bury, Lancashire.
Woodhouse, William Henry, London.
Williams, Joseph, Manchester.
Whatford, Jack Thomas, Brighton.
Wood, John, Brighton.
Wood, Jr., William Robert, Brighton.
Wood, John, Dumfries.
Wilson, George, London.
Wilson, George, Hull.
Young, John Clarkson, Warrington.

EDITORIAL.

THE DENTAL COLLEGES.

We present the following list of the dental colleges of this country and Canada, with the names and addresses of the deans:

Baltimore College of Dental Surgery. F. J. S. Gorgas, Dean, 259 N. Eutaw St., Baltimore, Md.

Ohio College of Dental Surgery. H. A. Smith, Dean, 286 Race St., Cincinnati, Ohio.

Pennsylvania College of Dental Surgery. C. N. Peirce, Dean, 1617 Green St., Philadelphia, Pa.

Philadelphia Dental College. D. D. Smith, Dean, 1417 Walnut St., Philadelphia, Pa.

New York College of Dentistry. Frank Abbott, Dean, 22 W. Fortieth St., New York, N. Y.

Missouri Dental College. H. H. Mudd, Dean, 502 N. Fourteenth St., St. Louis, Mo.

Boston Dental College. Elisha Chenery, Dean, 65 Chandler St., Boston, Mass.

Harvard University, Dental Department. Thomas H. Chandler, Dean, 74 Commonwealth Ave., Boston, Mass.

Dental College of the University of Michigan. J. Taft, Dean, Ann Arbor, Mich.

Western College of Dental Surgeons. Henry Fisher, Dean, 1129 Washington Ave., St. Louis, Mo.

University of Pennsylvania, Dental Department. Charles J. Essig, Secretary of the Dental Faculty, 1533 Locust St., Philadelphia, Pa.

Dental Department of the University of Tennessee. Duncan Eve, Dean, 159 Church St., Nashville, Tenn.

Indiana Dental College. Junius E. Cravens, Secretary, Indianapolis, Ind.

Dental Department of Vanderbilt University. R. R. Freeman, Secretary, Nashville, Tenn.

Royal College of Dental Surgeons of Ontario. J. Branston Willmott, Secretary, Mechanics' Institute, Toronto, Canada.

BIBLIOGRAPHICAL.

EYESIGHT AND HOW TO CARE FOR IT. By GEORGE C. HARLAN, M.D. Philadelphia: Lindsay & Blakiston, 1879.

This, the fourth in the series of "American Health Primers," treats of the Anatomy of the Eye, the Physiology of Vision, the Ophthalmoscope, Injuries and Diseases of the Eye, Optical Defects, Spectacles, Practical Suggestions for the Care of the Eye, and the Effects of School Life upon the Sight. The object of the volume is to convey to the reader, in language free from technicalities, such knowledge of the structure and functions of the eye as will lead to an intelligent care of the organ. The anatomy and physiology of the eye and the laws of optics are tersely and plainly described. What to do in certain emergencies and what not to do as habits are taught, and many useful hints are given which are well worth remembering and acting upon. We commend the careful perusal of this little book to all who recognize how much of the pleasure of life, as well as the ability for service, depends upon integrity of vision.

A GUIDE TO SURGICAL DIAGNOSIS. By CHRISTOPHER HEATH, F.R.C.S. Philadelphia: Lindsay & Blakiston, 1879.

As its name indicates, the purpose of this volume is to assist the practitioner in the differential diagnosis of pathological conditions likely to be confounded. The so-called surgical affections are grouped anatomically, and the several characteristic symptoms of each methodically described, so that the reader may promptly inform himself as to the nature of the lesion under consideration. No attempt is made to discuss the pathology or treatment of any of the disorders described, and only their most salient points are specified. For convenience of reference, the tabular method of presenting the points of resemblance and dissimilarity is frequently employed. Very much useful information, easy of reference, is presented in small compass. The volume cannot fail to be of practical value to a large majority of those engaged in the treatment of disease.

THE STUDENT'S GUIDE TO THE DISEASES OF WOMEN. By ALFRED LEWIS GALABIN, M.A., M.D., F.R.C.P. With sixty-three illustrations. Philadelphia: Lindsay & Blakiston, 1879.

A plain, practical, and comprehensive discussion of the diseases peculiar to women, their etiology and pathology, their diagnosis and treatment.

PERISCOPE.

Dentigerous Cyst of Lower Jaw.—W. A. C., aged thirty-four, a french-polisher, was admitted March 5, 1877, with the following history. He had been a soldier, and had contracted syphilis. He was not salivated. He spent some of his time in India as a soldier. Had been a moderate drinker. About nine years ago he noticed a swelling of his cheek, the size of a marble, which he attributed to a fall. It gradually got bigger, but only inconvenienced him by its size and disfigurement.

On admission he was a well-nourished man, the tongue clean, and general health good. He complained of occasional pain in the tumor. There was a tumor the size of an ordinary orange, round, very hard, fixed to the angle of the lower jaw on the right side; the edges were well defined, the overlying skin natural. There was neither fluctuation nor pulsation, but the facial artery could be felt pulsating over it. Felt from the mouth, the anterior part of the wall of the tumor yielded slightly to pressure.

On March 7, the patient being under chloroform, Mr. Heath punctured the yielding part of the tumor with a large trocar from the mouth. It was found to be a large hollow cyst, with no fluid in it. The walls of the cyst were broken down, and some pieces of bone removed with the bone forceps. The cavity was then plugged with lint. The cyst was lined with soft tissue, which, on microscopical examination, showed portions of hyaline cartilage, and cartilage with a faintly fibrous matrix, surrounded by and gradually passing into oval and spindle cells. Two days later the plugs were removed, and the cavity was well syringed with Condy's fluid.

On March 21 the walls of the cyst were again forcibly crushed, and the fragments removed. The cyst extended in between the two tables of bone, but the inner table of the jaw and the teeth were unimpaired. The cavity was plugged with lint.

Next day there was considerable swelling of the lip and cheek. There was no sensation in the right lower lip. The swelling, however, gradually went down, and in three or four days sensation in the lower lip returned.

On the 26th, Mr. Heath removed two small pieces of bone, which had become detached by suppuration. They were a quarter of an inch square. A few small pieces of bone were removed in the dressings two days later.

On April 5 the patient was much better, and the swelling was much less.

He was discharged on April 5. A fortnight later he attended the hospital, and an examination of the tumor was made. At the bottom of the cavity a tooth was felt firmly attached. The tooth was removed by forceps, and was found to be a bicuspid, with a perfect crown to it and two small fangs. After this the cavity closed, and later on the right cheek appeared like its fellow, all swelling having disappeared.

Remarks by Mr. Heath.—This case of dentigerous cyst is remarkable for the advanced age at which it occurred, and also for the fact that the cyst was empty, the fluid which must have been present at one time having become absorbed. A careful search for a tooth was made at the time of the operation, but it could not be found, and the explanation of its discovery at a later date is probably that the lining membrane of the cyst had completely covered in the tooth, which only became apparent when the membrane had been destroyed by suppuration. It will be noted that no external incision was needed in this case, and there can be no question that cases of extensive cystic growth may be more satisfactorily treated from within the mouth by crushing the cysts and removing any solid material contained in them, and thus preserving the lower border of the jaw, than by removal of the entire thickness of bone.—*University Hospital Reports, in The Lancet.*

Case of Syphilitic Inoculation by a Tooth-Brush.—A. B., a healthy-looking boy of three, was brought to me on the 3d of April last, at the Blackfriars Hospital for Diseases of the Skin, on account of an eruption that had made its appearance on the belly a few days before, and had spread rapidly to other parts. On stripping him I found the body covered with a well-marked secondary syphilide of the papular kind. The distribution of the rash was symmetrical; it was limited to the trunk, the skin over the limbs and head being quite clear. The tonsils were swollen, and the fauces reddened, but not ulcerated. On the dorsum of the tongue there was a circular erosion as big as a hemp-seed, surrounded by a vascular halo. There were no signs of constitutional disturbance.

A careful search was made for the primary sore. Just under the edge of the lower jaw, on the left side, I discovered a swollen gland, as large as a walnut, and of stony hardness. None of the other lymphatic glands in the body were appreciably enlarged. Inspection of the gums and inside of the cheek, however, disclosed nothing abnormal. Suspecting that inoculation had occurred in the gum, I questioned the mother closely, and elicited the fact that she had punished the child some six or seven weeks before for sucking his father's tooth-brush. The father was suffering at the time from an "ulcerated mouth." I then got the mother to undo her dress, and found her chest and shoulders pretty abundantly covered with a macular exanthem, undoubtedly secondary, which had been out for about two months, but for which, as it had caused her no inconvenience, she had not sought advice.

The child quickly recovered under small doses of the perchloride of mercury. The rash faded, and the enlarged gland grew softer and shrank. Some years hence he may probably develop symptoms of a kind most puzzling to any observer ignorant of the present interesting episode in his pathological history.

My object in publishing this case is not so much to add one to the numerous instances in which syphilis has been communicated in unusual ways and at unusual periods of life; it is rather to draw attention to the fact that the possibility of accidental inoculation is not, perhaps, always so vividly before our mind as it should be. Any one who has occasion to see much of constitutional syphilis must be struck with the occasional impossibility of tracing the disease to its source. The difficulty is generally, and for the most part, correctly set down to the not unnatural dislike of patients to admit exposure to the usual sources of infection. But I am convinced that our skepticism may sometimes be pushed too far. I am satisfied that in a small residue of cases the patient is really in the dark as to the cause of his malady, the immediate effects of inoculation not having been troublesome enough to make him seek professional advice, and the seat of primary mischief not being such as to excite his suspicions regarding its nature. It is conceivable, for example, though I have never met with a case, that inoculation may be effected by laryngeal or dental instruments, especially by the latter. It is customary to wash such instruments in water after using them, though I have known even this precaution neglected. But I am inclined to think, from some inquiries I have made, that they are not, as a rule, soaked in any disinfectant liquid,—the only process capable of affording an absolute immunity from the risk of specific contamination. It must be remembered that a patient who has a carious tooth stopped or extracted is not likely to go out of his way to state that he is suffering, or has suffered, from syphilis, and there may be no local signs of the disease to rouse the suspicions of the dental surgeon. There ought to be no difficulty in making it a universal and invariable practice to steep all instruments that are brought in contact with mucous surfaces in a solution of carbolic acid (1 to 20), or in one of potassic permanganate, after every time that they are used.—*E. Buchanan Baxter, M.D., in The Lancet.*

Dental Hemorrhage.—M. Hémard, principal medical officer at the Military Hospital at Versailles, forwarded to the Société de Chirurgie the account of the case of a man in whom, after the extraction of the second upper left molar tooth, hemorrhage persisted from June 30 to July 8, in spite of plugs, compression, actual cautery, etc. The man having become very feeble, the left common carotid was tied, with the effect of repressing the dental hemorrhage, frequent capillary hemorrhages, however, taking place from the wound. The ligature came away on the thirteenth day, but the wound had not completely cicatrized by October. The patient under tonics gradually recovered. The urine contained albumen and an excess of phosphates. M. Tillaux, in the discussion which ensued, expressed his doubts whether all had been tried before the ligature was resorted to. He had met with a case occurring in a student, in which he arrested the bleeding by plugging the alveolus with wax and causing digital compression to be made on this for about twenty-four hours by relays of friends. Cotton plugs imbibed with the perchloride may also be used in the same way, preceded or not by the cautery. If ligature were deemed necessary at all, the external carotid ought to have been tied, as danger from secondary hemorrhage is much less. On this point Prof. Verneuil quite agreed with M. Tillaux. He attributed the hemorrhage to the albuminuria, and it was in fact only arrested when quinine was given. To a student who had repeated dental hemorrhages he gave fifteen grains of quinine at a time, and that stopped the bleeding definitively. In all such cases quinine should first be tried. M. Magitot considered a plug formed of gutta-percha mingled with charpie or cotton as far superior to one of wax. It is elastic, and retains its place in the alveolus without any digital compression. He has never met with dental hemorrhage that could not be so arrested. Prof. Léon Lefort also blamed the preference given to the common carotid, and much prefers M. Magitot's plug, which adheres to the walls of the alveolus, to the wax plug, which allows the blood to pass by its sides. M. Després, however, stated that he had several times succeeded with the wax plug, taking care that the patient should keep compression upon it by means of his jaws.

At a subsequent meeting of the Société de Chirurgie, Dr. Magitot stated that in the account which he gave of the great efficacy of the gutta-percha plug, he had forgotten to mention that before its application the socket should be thoroughly washed out with chloroform. This dissolves gutta-percha and facilitates its adhesion; and so close is this adhesion sometimes, that two or three days after the application of the plug it requires a true forceps extraction for its removal. This preliminary application of chloroform must, therefore, never be omitted, or the plug will sometimes prove no more efficient than the old-fashioned one of wax. How serious a matter dental hemorrhage is may be judged of by the fact that M. Moreau has recently reported ten cases in which it proved fatal.—*Medical Times and Gazette.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Will some reader of the Dental Cosmos please inform me the reason of gold fillings crumbling and turning black at the edges? Also, what kind of instruments and gold to use to prevent the same? I use serrated points.—Morse.

Will some philologist tell whether the following inscription on a sign is correct?

John Smith, D.D.S.,
Dentist.

—— X.

Unqualified Dentists.—There are only seven dental offices in this village. Yet at the County Clerk's office there are thirteen names registered as having received certificates to practice dentistry. At least five of this number are students of only a few months' experience.

Will the act bear such stretching? Will the profession give its sanction to such liberties? Is it fair or just?—Dentist, *Ithaca, N. Y.*

In response to several inquiries as to whether Dr. J. N. Farrar manufactures and furnishes to order regulating apparatus for the profession, we have to say that although he has done so in some half-dozen instances as a matter of accommodation, he does not and has not proposed to do so as a matter of business, and is not interested in the manufacture or sale of regulating apparatus. This statement seems necessary to remove erroneous impressions concerning Dr. Farrar's communications.—Editor Dental Cosmos.

THE

DENTAL COSMOS.

VOL. XXI. PHILADELPHIA, NOVEMBER, 1879. No. 11.

ORIGINAL COMMUNICATIONS.

ON PERICEMENTUM AND PERICEMENTITIS.

BY C. F. W. BÖDECKER, D.D.S., M.D.S., NEW YORK, N. Y.

A. *Pericementum, its forms and development.*—The pericementum (root membrane, or alveolo-dental periosteum, etc., as it has been termed by former writers) is a formation of connective tissue, identical with the periosteum which covers all bones. It consists of a layer interposed between the roots of the teeth and their corresponding bony alveoli, and is common to both. It is continuous with the connective tissue—the so-called sub-mucous layer of the gum—and with the periosteum of the maxillæ. Its fibers are connected with the cementum of the root as well as with the wall of the alveolus. A few writers have described the pericementum as a double membrane, one of which belongs to the root, the other to the alveolus; but I have not been able to see anything that justifies such a separation. In many of my specimens the connective-tissue bundles of the pericementum can be traced from the socket to the cementum of the root of the tooth, or in connection with the reticular structure in the vicinity of the root. Only in a few specimens have I seen close around the root a thin layer of very dense and fine fibers, the general direction of which was not fully identical with that of the connective tissue which produces the main mass of the pericementum. The relations between the soft and hard formations of the jaws are very plain on specimens obtained from grown cats, and in all essential points are in accordance with those from human beings.

The course taken by the connective-tissue bundles is slightly wavy and oblique, starting from the cementum and running upwards toward the alveolus. The bundles of this tissue are very dense, without many decussations. The parallel direction of the bundles begins to change into a diverging one at about the height of the border of the socket, where the bundles become coarser, decussate, and thus produce the elastic connective-tissue cushion termed the gum.

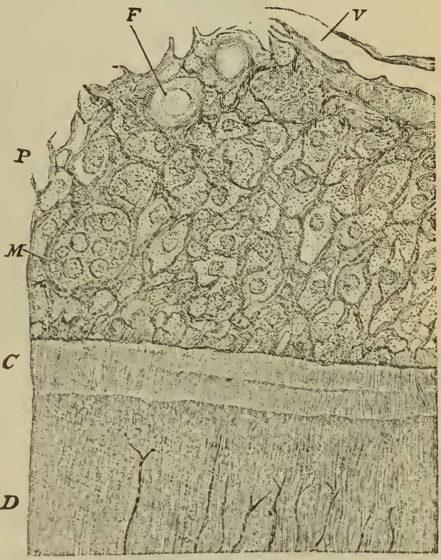
From the anatomical disposition of the pericementum conclusions may be drawn as to its physiological action. It is obvious that the relatively soft and elastic layer between the two bony formations—cementum and alveolus—is designed to lessen the concussion upon the jaw-bones during mastication. The oblique direction of the connective-tissue bundles is the most favorable for the suspension of the tooth within its socket, as the bundles correspond to the funnel shape of the socket, in the center of which is situated the conical root of the tooth. The elasticity of the layer of pericementum admits of a slight degree of motion of the roots, hence we understand the formation of facets on the proximate surfaces of the crowns of the teeth in crowded maxillary arches.

My specimens represent two varieties of pericementum,—one of a reticular structure, termed myxomatous; the other is altogether fibrous. The myxomatous variety I have met with as a rule in young individuals. It consists of delicate fibers, or bundles of fibers in a net-like arrangement, which in many instances are supplied with round or oblong nuclei at the points of intersection. The meshes contain either a hyaline, apparently structureless, sometimes finely granular basis-substance, or they hold protoplasmic bodies, provided with a varying number of nuclei. The nearer to the cementum the narrower is the myxomatous reticulum, and the smaller therefore are the inclosed protoplasmic bodies. The latter, in the immediate vicinity of the cementum, stand in more or less regular rows, entirely analogous to the protoplasmic bodies around the developing bony tissue known, since Gegenbaur, as "osteoblasts." Some of the meshes of the myxomatous tissue are considerably larger and contain multinuclear protoplasmic bodies, termed "myeloplaxes" by Robin, of Paris; giant-cells by R. Virchow, of Berlin, and myeloid cells by English authors. Other meshes hold fat-globules, which, in specimens preserved and hardened in a solution of chromic acid, very often contain closed spaces, so-called vacuoles. The myxomatous reticulum is traversed by numerous blood-vessels, mainly capillaries and veins, some of which can be seen entering the medullary spaces of the compact bone of the wall of the alveolus, and in connection with the capillary system of the cancellous portion of the alveolus. I have met with but few nerve-fibers in my specimens.

Fig. 1 illustrates a portion of the myxomatous variety of pericementum as shown with a relatively low power. High amplification of the microscope plainly demonstrates the delicate reticular structure of all protoplasmic bodies; the reticulum being visible not only in the contents of the meshes, but also within the fibers of the myxomatous reticulum. The latter feature is recognizable best on specimens deeply stained with chloride of gold. The apparently structureless or indistinctly granular myxomatous basis-substance, held in the meshes of the myxomatous reticulum, proves to be a reticular structure just as well as the protoplasm itself.

The second variety of pericementum is built up by fibrous connective tissue, which prevails in adults and persons of advanced age. The bundles of the fibrous connective tissue may be uniform in width throughout the whole pericementum; or there exists a zone of myxomatous or indistinctly fibrous character close around the cementum. The bundles are built up by a number of fibers which hold a varying amount of protoplasmic bodies; as a rule, more numerous the nearer to the cementum. On the latter there may be found rows of osteoblasts or scattered protoplasmic bodies alternating with bundles of a delicate connective tissue, which are directly attached to the cementum. In a few instances I have seen rows of osteoblasts, the refracting power of which was considerably augmented. Such corpuscles looked shining and structureless, evidently on account of a deposition of lime-salts. The fibrous variety of the pericementum also contains fat-globules, sometimes in a surprisingly large quantity.

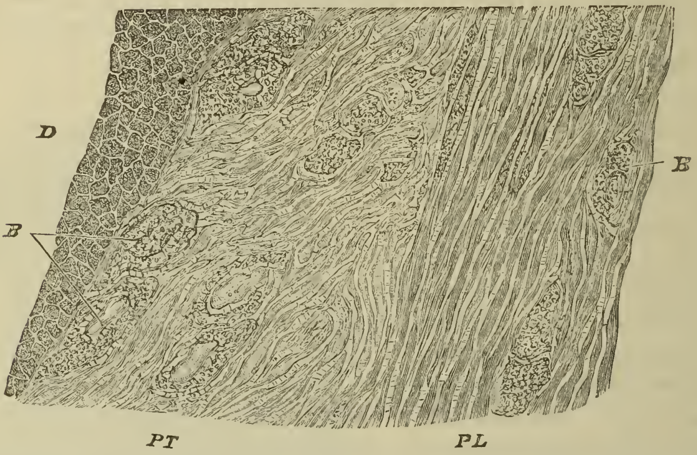
FIG. 1.



Pericementum of myxomatous structure. *D*, dentine; *C*, cementum of neck; *P*, pericementum; *M*, multinuclear protoplasmic body; *V*, capillary blood-vessel; *F*, fat-globule with a vacuole. Magnif. 500 diam.

High magnifying powers of the microscope reveal a structure of the fibrous connective tissue, as follows: The fibers, a certain number of which combine in the formation of a bundle, are delicate spindles, directly connected with each other at their pointed ends. These spindles are separated from each other by a narrow layer of a light substance, to the presence of which Tomsa, of Kiev, Russia, first drew attention, and for which he proposed the term "cement-substance." This substance is doubtless kindred to the gluey basis-substance which mainly builds up the spindles of the connective tissue. The interstices between the spindles are traversed in a vertical direction by extremely minute threads every way analogous to the thorns in the cement-substance surrounding epithelial elements. These threads in many instances are visible in specimens hardened by the chromic acid solution; they become very plain when thin sections have been stained in a half per cent. solution of chloride of gold for one or two hours, or until the specimen has assumed a dark violet color. If the stain be complete, we also recognize that the spindles are not homogeneous, as they look in fresh, unstained specimens, but are rather traversed by a delicate, dark violet reticulum, the points of intersection of which are slightly thickened, and thus represent granules.

FIG. 2.



Pericementum of fibrous structure. *D*, cementum of root; *PL*, pericementum, the fibers of which are built up by spindles, in longitudinal section; *PT*, pericementum, the elementary spindles of which are finer and cut obliquely; *B*, protoplasmic bodies, either so-called connective-tissue corpuscles or so-called osteoblasts. Magnif. 1200 diam.

Between the spindles of the basis-substance protoplasmic bodies are seen, the formerly so-called connective-tissue cells. Some of these bodies exhibit shining, compact, oblong nuclei, with a certain amount of surrounding protoplasm, while others are devoid of nuclei, and split into spindle-shaped or polygonal lumps, which in size and shape fully correspond to the elementary formations of the fibrous basis-substance. Where there is a central nucleus, it is invariably bounded by a light rim, which is pierced by radiating thorns. The latter connect the circumference of the nucleus with the granules of the protoplasm next to the nucleus. The protoplasm under all circumstances exhibits the well-known reticular structure. From the periphery of a protoplasmic body, each being surrounded by a light rim, minute threads spring forth, and run into the reticulum within the spindles of the basis-substance. The same relations are seen on protoplasmic bodies next to the cementum,—the so-called osteoblasts.

The offshoots of these formations run partly to the spindles of the basis-substance and partly into the light reticulum within the cementum. In some instances, between the cementum and the osteoblasts there is interposed a small layer of fibrous basis-substance in the shape of delicate slender spindles. The walls of the capillaries, which consist of a single layer of endothelia, are also connected with the neighboring spindles of the basis-substance by means of delicate threads, which traverse the light rim around the blood-vessels,—the so-called perivascular space. Lastly, such offshoots run also into the light reticulum of the bone-tissue where the pericementum is attached to the wall of the alveolus.

The question, What is the delicate reticulum present in all formations of protoplasm and basis-substance of the connective tissue? was first settled by C. Heitzmann (Sitzungs-Berichte der Kaiserlichen Academie in Wien, 1873). This observer claims that the reticulum is a formation of the living matter, from the fact that during locomotion of isolated protoplasmic bodies the reticulum continually changes its shape and locality, and also from the fact that in the inflammatory process the new formation of elements invariably starts from the points of intersection of the reticulum after their increase in size. According to this view, the reticulum of living matter holds in its meshes a lifeless fluid within the protoplasmic bodies; on the contrary, a solid substance in the matrix of the connective tissue. Thus a certain amount of motility is admitted in the protoplasm, while this property of the reticulum is lost after the accomplishment of the formation of the basis-substance. Although this view up to the present time is accepted by but a few observers, I claim its correctness upon the ground of observations which I have made on the pericementum and other varieties of connective tissue, both in their development and in an inflamed condition.

In its juvenile condition the pericementum represents a myxomatous connective tissue, the fibrous portion of which is relatively scanty, while the protoplasmic portion prevails. In this instance two varieties of basis-substance occur, viz., the fibrous, building up the reticulum, and the myxomatous, filling a certain amount of the meshes. This condition arises, first, from the indifferent or embryonal tissue, not only in the pericementum, but in all formations of connective tissue which, when fully developed, exhibit a fibrous structure. The only way to explain the formation of the myxomatous tissue is, that a part of the protoplasm constituting the embryonal elements remains unchanged, a part is transformed into spindles of the myxomatous reticulum, and a part into myxomatous basis-substance. It is impossible to understand the formation of basis-substance on the theory advanced by R. Virchow, that each embryonal "cell" at a certain period of its development produces an amount of basis-substance by what is imagined to be a secretory process. Not one fact in the history of the development of the connective tissue can be shown in accordance with this theory, and in our day it has been given up by the most advanced histologists.

The theory of the late Max Schultze, of Bonn, that all varieties of basis-substance are produced by the protoplasm itself, is very much more in harmony with the facts observable in developing connective tissue. The correctness of this theory is advocated at the present time by the best microscopists. In the pericementum, too, we see stages of formation of myxomatous tissue from original protoplasmic elements. But instead of saying with Max Schultze that the protoplasm perishes altogether from the moment it is transformed into basis-substance, we rather adopt the assertion of C. Heitzmann, that only the lifeless liquid portion of the protoplasm, the protoplasmic fluid, is transformed into a glue-giving basis-substance, while the reticulum of the living matter remains unchanged, and becomes imbedded in the solid basis-substance. Whatever chemical alteration takes place tending toward the production of a basis-substance in its four main varieties, myxomatous, fibrous, cartilaginous, or bony, the morphological appearance of the basis-substance will depend only upon the changes of shape which the protoplasmic bodies take up before their transmutation into basis-substance.

The final result may be, especially in pericementum, either a jelly-like myxomatous or a solid fibrous basis-substance. The living portion of the protoplasm at all events remains untouched by the chemical alteration of the lifeless fluid.

On this theory, the transformation of the myxomatous tissue of juvenile into the fibrous tissue of adult age is easily explicable. We only need assume a dissolution or liquefaction of the already formed basis-substance in order to understand the reappearance of the embryonal condition at a certain stage of development. The myxomatous tissue as such never changes directly into a fibrous one, but must first be reduced into its embryonal or protoplasmic condition, and from this in turn fibrous connective tissue may arise. The latter process is explained by splitting and elongation of the protoplasmic bodies into spindles which become solidified; in other words, the lifeless fluid is transformed into a gluey basis-substance.

At no time has the reticulum of the living matter been interrupted or torn; the pericementum has never ceased to be a tissue either in its embryonal, myxomatous, or fibrous condition. On the theory here explained, all changes in inflammatory processes of the pericementum may be easily understood.

(To be continued.)

OPERATIVE DENTISTRY.

BY MARSHALL H. WEBB, D.D.S., LANCASTER, PA.

(Continued from page 549.)

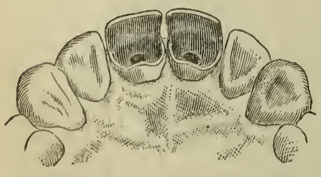
SHOULD decalcification of enamel and dentine be not prevented or arrested, part by part of tissue becomes fractured and its contour broken up, the death of the pulp takes place, the crown is soon gone, and the edges of enamel yet remaining scarcely rise above surrounding soft tissue. Even when a case presents with here and there a crownless root, treatment, such as indicated, should be commenced and continued till the remaining tissues are in normal condition. All operations that may be required ought to be performed as perfectly as possible, and artificial crowns placed upon the roots, especially those of the incisor, cuspid, and first bicuspid teeth. Where the root is gone, a porcelain face, with gold attachments, can be successfully built into the two adjoining teeth.

Where frail edges of enamel are to be supported and protected, the margins should be slightly beveled, that the tissue may be the better kept in place by gold, and this evenly finished to present a fine appearance when the operation is completed. Such operations may be better understood by the following description and illustration. This case presented after the pulp of each upper central incisor had been destroyed; which was done with arsenic several years before, when the patient was but sixteen. The devitalized tissue had been removed and the root of each tooth filled, partly with cotton and the remainder of the pulp-chamber and the whole of the cavity of decay with oxychloride of zinc. Abscess had once taken place and a fistulous opening had been formed in connection with the left central incisor. The cementum remained in vital condition and the teeth were firm in their sockets. The crowns presented a very dark appearance, owing to the coloring of the protoplasm in the fibers throughout the dentinal canaliculi and the network in the basis-substance. Efforts had been made at bleaching with chloride of lime and acetic acid, but these improved the appearance only temporarily. Dr. W. H. Atkinson's favorite method of bleaching had not been employed. This consists in the removal of as much dentine as can be afforded without rendering the crown too frail, and, after filling the pulp-chamber securely, packing the cavity full of alum, and then saturating this with "Labarraque's solution of chlorinated soda." If the change be not satisfactory after one application, the process should be repeated until the desired shade is had. "The bleaching effect is supposed to be the action of free chlorine upon the colored protoplasm in the fibers of dentinal structures. Whatever the action is it does the work in so short a time that it may be watched throughout and arrested at pleasure."

Oxychloride of zinc did not serve the purpose of giving the proper tint or shade through the enamel; besides, this could not add the necessary strength to the tissue, which had to be supported and protected when the dentine was removed. To restore the shade of the crowns approximately it was necessary to remove all the dentine from the cutting edge to the neck of each tooth, with the exception of a thin layer about the line of junction of the enamel and cementum. There was a large cavity in both the mesial and distal parts of each crown, and a portion of the palatal wall of enamel was missing; the labial surface was unbroken, except a small part along the mesial line of the right central incisor. Decalcification of the dentine in the mesial portion had advanced so far as to reach that in the distal wall of each crown.

After removing the material that had been placed in each cavity and pulp-chamber, and seeing that the parts about the roots remained in normal or in a tolerable condition, the writer applied the rubber dam, and removed all the remaining palatal portion of enamel from the cutting edge to within about two lines of the neck of each tooth, this part being left to aid in securing the gold. All the dentine was then removed to the extent stated. The cutting edge of the labial wall of enamel was cut off and slightly beveled outwardly with a corundum wheel, and evenly and finely finished with fine emery cloth, so as to be in line with the edge of the lateral incisors, that this part of remaining tissue might be protected by an edge of a full thirty-second or a sixteenth of an inch of gold to be placed over it, and an even line or edge of enamel be presented to sight. The mesial and distal as well as the cutting edge of the enamel was evenly and smoothly finished with strips of emery cloth, No. ½ and No. 0. All this was done with each central, and each operation completed at two separate sittings. When prepared as described and ready for the gold, that which remained of the crowns appeared as here illustrated. The discolored dentine that extended some distance into the root was cut away; all foreign particles were removed, and the pulp-chamber was somewhat enlarged with a Gates drill to the apical foramen, which was then closed with gold and the operation of restoring the contour of the crown commenced. The gold in that part of the pulp-chamber not in sight was inserted by the aid of a hand-mallet, and all the rest impacted with the electro-magnetic, the packing instrument being very carefully operated upon

FIG. 2.

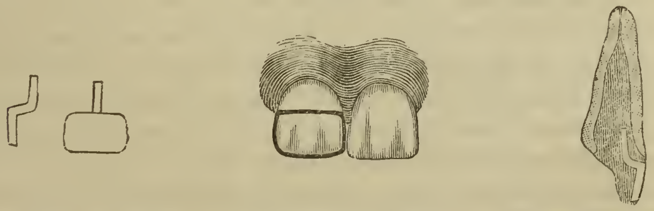


the foil placed against the inner portion and the edge of the labial wall of enamel. Cohesive foil No. 4 was folded to No. 16, and placed against the wall of enamel while No. 30 gold was built into the body of the crown. The whole operation was performed without fracture of the enamel. When completed properly these operations not only support and protect the tissue against and over the edges of which the gold has been placed, but the gold-tint is seen through the translucent enamel, even though there was marked discoloration before the operation was commenced. In the case just described there was not only restoration of the crowns of the central incisors to their original contour and usefulness, but, in place of the dark discoloration, there appeared a rich and bright, though delicate and not very perceptible gold-tint through the enamel, which now exhibited its former translucency almost to the full extent.

In cases where a portion of the crown has been fractured, and when it seems better to preserve the remainder than save only the root and place a crown thereon, a method like the following may be adopted. The operation here described and illustrated was performed by the writer in May, 1872, and it has thus far proved successful. The placing of a piece of porcelain in oxychloride of zinc in a cavity within the labial wall of a crown and building foil around and between it and the surrounding enamel, thus presenting only a narrow line of gold to view, suggested this operation.

The lady for whom the operation was performed was but eleven years of age when the right upper central incisor was broken off transversely by a fall. The tooth was neglected for three years, during which time a large portion of the dentine had disintegrated. No abscess had or has taken place, and the cementum remains in normal condition. Soon after the patient presented herself the root was filled and the original form of the crown restored with gold; but that a better appearance might be presented, a piece of porcelain was inserted in the labial surface. This was held in position with the fingers of the left hand while narrow pieces of cohesive gold were built around and about the end which extended partly up the pulp-chamber.

Fig. 3.



Side and front view of the piece of porcelain.

Labial surface, with porcelain in position.

Diagram giving side view, with porcelain in place.

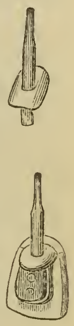
All the gold was impacted with the mallet (an automatic; better to have had and used the electro-magnetic) and placed against the prepared margin of the enamel and back of and around the porcelain, which was thus secured. The gold surrounding the porcelain part of the labial surface is about a half-line wide, as shown in the cut (Fig. 3).

If the pulp be living in such a case of fracture a suitable piece of porcelain could be made and fitted to a gold plate, and this extended, anchored, and built with gold foil into a cavity prepared to receive the same in the remaining palatal portion of the crown.

Where fracture of enamel has been extensive, and its contour almost or entirely broken up, it is necessary to prepare the root for the placing of an artificial crown upon it. In all operations upon pulpless teeth or roots care must be taken that no irritation be induced.

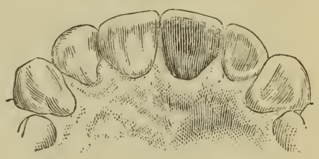
Preparatory to mounting a crown in the manner now to be described the root should be cut beyond the margin of the gum and a plain "pivot tooth" placed upon it by means of wood surrounded with white gutta-percha, which, when made plastic by heat and the whole inserted, protrudes and presses the gum away from the margin of the root. After this temporary crown has been in place a few days a gold wire (about No. 14) should be accurately fitted in and placed as far up the root as possible. A gold plate, No. 26 (18-k.), should be fitted to the prepared surface of the root, and an opening made in it just large enough for the wire to pass through. The plate and wire should be placed in position and the latter marked with the point of a knife or lancet-blade, so that when the wire is put into a suitable hole made in the plate, and the latter placed upon charcoal, there shall be no difficulty in deciding just where to solder the parts together. When thus fitted, soldered, and then annealed, the gold wire and plate should again be placed in position and more accurately fitted to the root. There should be no movement of the metal while the edges of the plate are being fitted to the prepared surface of the root by the aid of the mallet. After this is done the wire should be cut off to within about two lines of the outer surface of the plate, and the edge of the latter so trimmed as to be on a line with the circumference of the root, and then, with wire and plate in position, an impression of the parts should be taken in plaster of Paris or "modelling composition." An illustration of a wire and plate, after having been fitted as described, is here given (Fig. 4). When this is done and the wire and plate taken from the root and put in place in the impression, a correct model of the teeth and parts adjoining can be made with the gold in the same relative position as when in the mouth. After the model is made, the gold removed from it, the end of the wire which extended outside the root to aid in marking the position of the wire and plate in the impression cut off and filed down to the surface of the plate, a thick, narrow gold backing should be fitted and riveted to a suitable crown (plain "plate tooth" with "straight pins") and a groove be cut along each side, and in some cases near the cutting edge of the porcelain, as illustrated in Figs. 4 and 6, *b*. This is done that the parts may then be built out and the porcelain more perfectly secured, and the contour of the palatal portion restored with pure gold, as shown in the cut with crown in place. After the backing is placed upon the porcelain it should be attached to the plate with wax, and the whole carefully removed from the model, encased in plaster and sand, gradually heated, and soldered. The parts, prepared as described and illustrated, may be held by screwing the wire in a hand-vise while the gold foil is being built in place. This can be done with the electromagnetic mallet, and the crown made ready for insertion by the time of the next appointment with the patient.

FIG. 4.



A very good and less difficult method of preparing crowns is to back the whole of the porcelain and restore the contour of the palatal portion with fine gold plate (18- to 22-k.), united with correspondingly fine solder.

FIG. 5.



The apical foramen should be closed with gold. If gutta-percha or oxychloride of zinc be used for this purpose some of the material may be pressed through the foramen, but with gold the operation can be made more certain and satisfactory. To avoid any exposure of gold should recession of the gum take place, the edge of the plate ought to be so cut away that the porcelain may be accurately fitted upon the labial portion of the root.

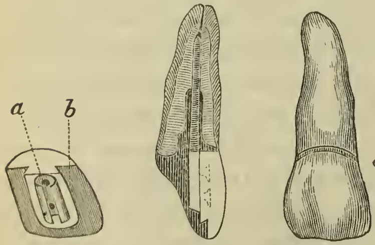
When all is in readiness for placing the crown upon the root, fine barbs should be made with a knife or lancet along the entire surface of the gold wire, a thin layer of Hill's stopping (or any good white gutta-percha) placed around the wire and against the plate; the metallic parts should be heated sufficiently to soften the gutta-percha, and then, with the root dried, the whole must be immediately pressed and carefully malleted to place. The surplus stopping should be trimmed off with a lancet a few hours or the day after the crown is placed upon the root, when the gutta-percha will be thoroughly cooled; the gum will then have been so pressed away that the boundary-line between the crown and root can be seen and the edge of the gutta-percha smoothly finished with pellets of Japanese bibulous paper, lint, or cotton, saturated with chloroform.

There is a still less difficult and yet good method of placing crowns upon roots of teeth, and one, too, that does not require so much time as that just described; but the root should be prepared and a gold wire fitted in it in the same manner. A suitable plain "pivot" crown, having a hole in it a little larger than the gold wire, should be selected and fitted to the surface of the root as perfectly as possible, and the opening in the porcelain filled with fine, well-seasoned hickory-wood, which must then be cut off even with the base of the crown and a hole drilled in the center and entirely through it large enough to insert one end of the wire. Insoluble cement may serve the same purpose as wood. The surface of the wire should be roughened or finely barbed along its whole length, one end placed (not malleted) tightly in the opening made for it in the wood in the crown, and the whole then placed upon the root and finished as above described.

An artificial crown, by whatever method mounted, can be more successfully placed upon a root, and all operations better performed, when the rubber dam is applied than where it is not used, and it should therefore be secured, if possible, to the adjoining teeth and then to the root before the final fitting and mounting of the crown.

Building crowns of gold upon roots of teeth and facing them with porcelain makes the most permanent operation, although very difficult. After preparing the root, closing the foramen with gold, and cutting away the irregular or projecting edges to within about a half-line of the margin of the gum (leaving this much to aid in applying the rubber dam), a gold wire, No. 13 or 14, with a fine, sharp thread cut upon it, should be accurately fitted in the pulp-chamber to near the apical foramen. To the platinum pins of the porcelain selected for the case a cylinder or tube made of gold plate should be fitted, and, after it is opened as illustrated (*a*), riveted and then closed, placed in plaster and fine sand, and carefully heated and soldered. A thread must then be cut in the cylinder corresponding to that upon the wire to which it is to be attached. This is done that the crown may be more securely placed upon the root than by the method described by the writer in the DENTAL COSMOS, June, 1873. The end of the gold tube next the cutting edge of the crown may be beveled and a slot made in the wire at that part, so that the cylinder will be prevented from turning; while still greater strength is added by impacting gold into the open part, thus spreading the end of the wire. A groove should be cut with a corundum disk in each side (*b*), and sometimes along the cutting edge of the porcelain, into which gold foil is to be placed, to secure greater strength and permanency.

FIG. 6.



When all is in readiness for the operation, the rubber dam should be applied to two teeth each side of the root and to the root itself. The ligature of waxed floss silk should be placed twice around the root, tightened and pressed well to place with a burnisher, the ends of the silk wrapped twice, as in tying a surgeon's knot, and the ligature then attached to the ring at the end of an elastic rubber dam holder and held just below the edge of the slightly upraised lip, so that, when the holder is fixed to a tie put around the patient's neck, there shall be constant tension upon the ligature. After this has been done the root should be trimmed down with corundum wheels or cones to the ligature, although not close enough to displace it. The porcelain should then be so fitted as to leave a half-line of space to be filled with gold (as at *c*) between it and the root, after the wire has been placed in the cylinder and screwed into the root. In placing the parts in position a little oxychloride of zinc, nearly the consistency of cream, should be placed in the root next the gold that closes the foramen, and the gold wire at once put in this and screwed securely to place. After the oxychloride of zinc has crystallized, sufficient of it and of the dentine should be cut away with small burs to secure good anchorage for the gold now to be placed as perfectly and solidly as possible around the wire, to and over the margin of the root, along the gold tube, into the grooves made in the porcelain, and between it and the labial margin of the root (*c*). While the gold is being placed around the wire in the root the porcelain can be turned a little to one side upon the gold wire till the cylinder is reached and restoration of the contour of the parts commenced. All the gold should be cohesive and impacted by the aid of the electro-magnetic mallet, with which the surplus foil can easily be trimmed away from the margin of the root as placed upon it, and the form of the crown so nicely carried forward that but little dressing is afterwards necessary. The gold should be filed even with the margin of the root, and finished with narrow strips of fine emery cloth at and near that point, while the rubber dam is yet in place; after this is removed the gold should be so cut away as to allow proper occlusion of the teeth, and a little space should be gained by very careful wedging for the trimming and finishing of the gold along each proximate surface separately, in the manner before described.

In placing crowns upon roots of second bicuspid and those of molar teeth, it is best to insert a suitable gold wire, with a fine, sharp thread cut upon it, and build around, over the same, and restore the entire contour of the crown with gold foil. Such operations are not so difficult as those where gold crowns are faced with porcelain, neither do they require as much time. In some such cases two books (¼ oz.) of No. 60 gold (should as much be required), can be carefully impacted and the crown properly formed in about two or two and a half hours with the aid of the electro-magnetic mallet and some one to pass the narrow pieces over the flame of alcohol and to place.

(To be continued.)

REGULATION OF TEETH MADE EASY BY THE POSITIVE SYSTEM.

BY J. N. FARRAR, M.D., D.D.S., BROOKLYN, N. Y.

(Continued from page 306.)

XI.

The varying conditions of cases of irregularities of the teeth, necessitating a corresponding variation in the construction of fixtures and their management, makes it possible to illustrate and explain them only to a limited extent. Therefore, only the simplest and most practical have been attempted. Many of these even have been only outlined in the simplest manner, and many details have been omitted for the sake of brevity.

The injurious effects of overcrowded teeth; of bunglingly-made and badly-fitted fixtures, whether rubber bands or ligatures, about the necks of teeth, impinging upon the gums; of regulating apparatus enveloping the entire crowns of teeth; of long-worn and improperly-fitted plates and clasps belonging to artificial teeth; of neglect of patients as to cleanliness of the mouth; of rash and too rapid movement of teeth in regulating, have led to the thought that bands made as suggested in former papers, bound about the crown (not the necks), may likewise be detrimental.

Having regulated teeth for sixteen years (practicing for the last seven years almost exclusively by the positive system), the writer not only believes that apparatus made and applied as set forth offers the least liability to accidents, but he has as yet to see the first symptom of injury to the teeth of his patients by the use of any of his fixtures.

Having described heretofore the methods of regulating teeth by the intermitting pressure, by the use of the screw,—a method founded upon safe and practical scientific principles, proven over and over again in my practice, I wish now, for a moment, to draw attention to another method, which, though not so accurate in its workings, is yet a practical method of regulating some teeth upon the intermittent principle without the use of screws. This may sometimes be accomplished by the agency of the old and well-known inclined plane; by the use of wooden wedges or blocks inserted between the teeth; or by wooden pegs set in holes in rubber plates, renewed or variously changed in form and position from time to time, as the case may require. These, by becoming wet by the saliva, swell, thus causing a little additional pressure for about an hour to the migrating teeth. In some cases, if sufficient care is taken, the desired end may thus be gained without much inconvenience to the patient; but as this method is so old and well known it requires no further explanation. We will pass on to consider another plan of accomplishing the same purpose, which, although also old in principle, is worthy of mention,—the use of pieces of plate bent from time to time, so as to maintain sufficient temporary force against the teeth. (I do not include that class of appliances which are so constructed as to maintain *continued* pressure.) This plan is practical with variously constructed fixtures, from a size less than that of the smallest tooth to that of the roof of the mouth; but, as a rule, small fixtures of this variety give the best results. First, for instance, a small piece of thick plate, an eighth of an inch or more wide, and half an inch or more in length, bent somewhat into the form of the letter U, can be made by being opened more and more, from day to day, to spread teeth sufficiently apart to insert an artificial one. By the use of longer bars or narrow plate, constructed on the same principle, extending across the mouth, secured to teeth in pits or by binders for anchorage, they may be made to successfully move teeth into line which have erupted in the posterior position on the opposite side of the mouth.

Irregular and protruding front teeth may be drawn into position by the same plan, by occasionally bending metallic fingers extending from a plate secured inside of the mouth, and passing between or over the cutting edges of the teeth. This variety of fixture, although old and well known, is a favorite with many dentists.

Besides the lateral movement of teeth, rotation may be accomplished to a certain degree, in some cases, by occasional bending of these metallic fingers. I know of no better illustration of this principle than the description of a little fixture devised by Dr. Simeon H. Guilford for correcting upper central incisor teeth standing in positions as shown in Figs. 55 and 56, which illustrate two common (reversed) forms of irregularity.*

In substance I quote his own description. Made of gold, it is constructed on a model of the teeth as follows: A piece of gold backing cut an eighth of an inch wide, and of sufficient length to extend along and a trifle beyond the palatal surfaces of the centrals, is bent to conform as closely as possible to the lingual surfaces of these teeth, and forward so as to slightly clasp the disto-palatal angles, as shown in *a*, Fig. 57. To this are soldered two strips cut from upper plate scrap, a little narrower than the first piece, and bent in the form of *b*, and *c*, Fig. 57, respectively, which are sufficiently long to extend slightly over the anterior and posterior surfaces of the teeth. After being properly shaped to fit the model, their backs are soldered together, and, in turn, soldered to the part (*a*), as shown in Fig. 58. The only thing then to be done is to reduce with a file the thickness of the part *b*, *c*, which passes between the teeth. Before applying such a fixture, it may be necessary to place a piece of wood between the teeth for a few hours, to separate them sufficiently to admit the appliance. The labial part of the apparatus should rest against the teeth just at, or slightly above, the most prominent part of their convexity; while the lingual portion should be near the gum (not quite touching it), and the slightly curved ends of this part will catch just above the little nodule usually found on the disto-palatal angle near the gum. When thus secured it cannot easily be displaced by the action of lip or tongue. Bend the long palatal arms slightly towards the short labial ones daily, and spring it back into position on the teeth. The elasticity of the gold stiffened by the solder will do the work.

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* For the woodcuts Nos. 55 to 69, I am indebted to the kindness of Messrs. Johnson & Lund.

Fig. 55.

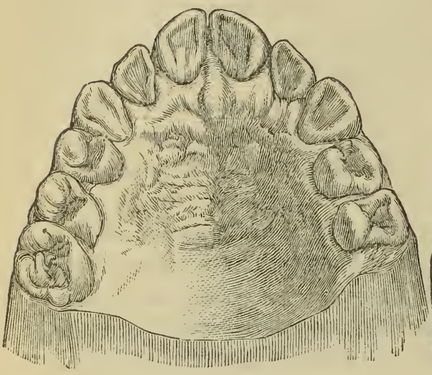


Fig. 56.

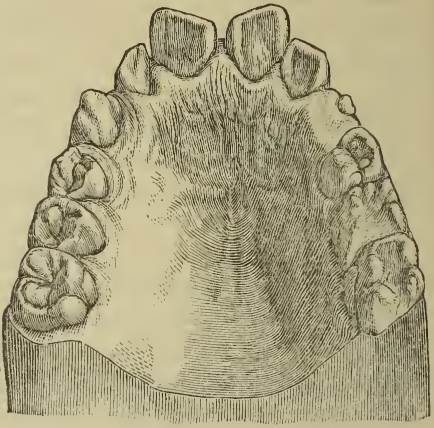


Fig. 57.

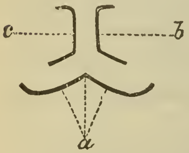
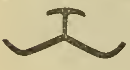


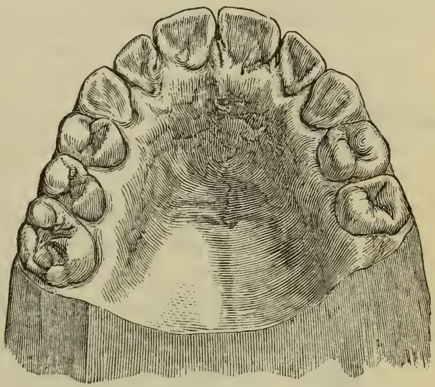
Fig. 58.



"By this method," Dr. Guilford says, "the use of all rubber or silk ligatures, so irritating to the gum and so painful in their application, is dispensed with." To guard against its accidental loosening, tie it to a tooth with a thread.

Fig. 55 represents Dr. Guilford's case before, and Fig. 59 the same case after a treatment of ten days,—the patient having been seen every day. The general form of this appliance is equally useful in correcting teeth situated in the reverse position, where the distal surfaces are inclined outward and the mesial inward; the construction and its operation being simply reversed, so that the long arm or band may rest on the labial and the short one on the palatal surfaces, and so bent as to throw the distal angles inward. The same appliance, slightly modified, he says, is useful also for rotating a single incisor where its mate is already in position. In this case the end of the appliance is fitted nicely to the tooth in position, while the other half is so shaped as to give the desired pressure on the tooth to be rotated.

Fig. 59.



As before said, in the use of metal bent occasionally for the purpose of additional pressure, it is not possible at all times to produce exactly a proper and uniform force; yet if care be exercised it may be sufficiently attained, in some cases, to accomplish the ends desired. Notwithstanding this, I have long since abandoned the plan for more accurate movement by the screw. Figs. 60 and 61 represent one of my favorite devices for this class of operations.

Fig. 60.

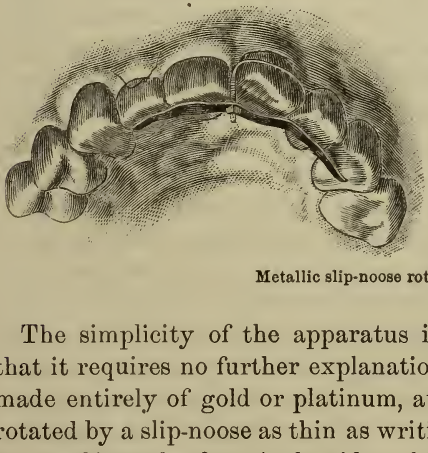
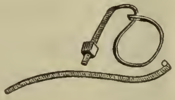


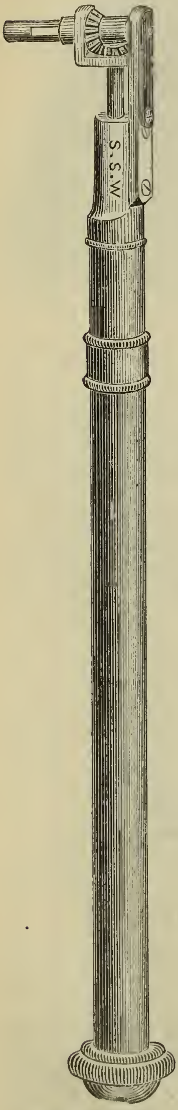
Fig. 61.



Metallic slip-noose rotating fixtures.

The simplicity of the apparatus is so plainly shown by the cut that it requires no further explanation than to say that it is generally made entirely of gold or platinum, and bound upon the tooth to be rotated by a slip-noose as thin as writing-paper, and about one-twelfth to one-fifteenth of an inch wide, which is tightened by means of a nut screwed against a small strip of plate, resting against other teeth. This case, illustrated by Fig. 60, which was only seen *once* by myself during the operation of rotation, was manipulated *entirely* by the patient (about thirty years of age), and was *painlessly completed in one week.* After being rotated, the teeth were retained in their relative positions by means of a double ox-yoke retainer. In these operations, where only one tooth needs rotating, there is generally required a rest-bar of sufficient length to bear upon two teeth each side of the one rotated, in order to prevent the forcing of others out of position.

Fig. 62.



Right-angle regulating key.

If the teeth are so shaped and the arch is such that the plate bar will not rest firmly, it may be made more secure by soldering, at right angles to one or both ends of the bar, a little point to rest in a shallow pit made in the lingual surface of the tooth; or, what is often better, tied to the teeth with a thread passed through holes in the end of the bar.

It may be thought that a nut facing towards the back of the mouth, as here shown, or as suggested in some of my previous illustrations (notably Fig. 7, on page 84, in the February number, 1878, of the Dental Cosmos), may be difficult to manage; but it is as easily operated as in any other case by properly made keys. While most of my fixtures are worked by the straight and curved "box-keys," flat, open wrenches, or by pointed levers, which fit into holes, as illustrated on page 80 (February, 1879), I have a right-angle key, Fig. 62, made to work on bevel-gearing similar to that used for right-angle drill attachments to the dental engine; which enables a patient to operate the screws and nuts of any fixture, in any part of the mouth, as easily as he could wind his watch.

As cleanliness of the mouth is of the utmost importance, it is necessary that regulating apparatus be delicately constructed and closely fitted, and, at the same time, be easy to remove and replace. Of all fixtures I have ever seen none is more easily removed and readjusted than those constructed on the screw principle as suggested. My patients, with a little instruction, are not only able to manage most of the regulating process, but generally soon learn to remove, cleanse, and replace the fixtures with ease.

Although having heard none worthy of consideration, I have sometimes been amused at some of the criticisms made adverse to the positive system as advocated by me. The best one which so far has come to my knowledge I will quote, and leave my readers to make their own comments: "If the subsequent or main portion of operations of regulating teeth is made so easy (by the use of fixtures constructed on the positive plan of mechanism) that patients can and are allowed to conduct most of the regulating process at their homes, especially if they can do it with little or no pain, they will not only fail to appreciate these advantages, but will not be willing to adequately remunerate the dentist for his skill."

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.—NINETEENTH ANNUAL SESSION.

SECOND DAY—*Evening Session.*

THE association was called to order at the usual hour, President McKellops in the chair.

The Second Section was passed, and the Third Section, Dental Literature and Nomenclature, was called.

Dr. Atkinson, chairman of the section, said that two reports had been prepared, one on "Dental Literature," the other on "Nomenclature and Terminology."

The report on "Dental Literature" was read by Dr. Taft:

The literature of the world is one of its most important instrumentalities. No department of science can afford to ignore its literature, which is the written record of the acts, words, thoughts, and opinions of those who have pursued its paths. Dentistry had no place among the sciences until it had acquired a literature. It is impossible to estimate the influence of its literature on the profession, the present status of which is in great measure due to it. During the seventeenth century but little was written upon dentistry—only a few crude efforts; but during the eighteenth century the value of a literature began to be more fully recognized, mostly in Europe. Of twenty works published prior to 1800, eight were printed in England, eleven in France, and one in Vienna. Previous to the present century nothing of importance was published in this country. During the first forty years of this century works multiplied rapidly, mostly in France and England, with S. S. Fitch, Solyman Brown, H. H. Hayden, and C. A. Harris engaged in the work on this side.

In 1839 the *American Journal of Dental Science* was inaugurated. The first volume contains the first record of organized action by an American association of dentists, which was in 1840. There are now about one hundred associations, national, State, and local, in active operation. The good accomplished for the profession by these organizations is beyond estimation. That they have been strengthened by the literature of the profession is undoubted. In 1839 the first periodical was established; it is still in existence, and has been followed by others which exerted an immense influence in moulding the thought of the profession. The Baltimore College of Dental Surgery was established in 1839 and held its first session in 1840. There are now fourteen colleges in active operation in this country. Their very existence is based on and sustained by our literature; without it how feeble would have been their influence! That the journals have been free from error none will pretend. The early views of dentistry were circumscribed. Growth in knowledge involved constant variation in what was said or written. That which was valuable at one time would in a few years or a few months become changed or obsolete. Our literature should be valued for the good it has accomplished. A retrospective view must carry the conviction that it has been one of the chief elements in the growth and one of the most important aids in sustaining the profession. It may with truth be said that our periodicals compare favorably with those of the medical profession.

The report then proceeded to notice the dental text-books published during the year. The first noticed was Dr. Adolph Witzel's, "Die antiseptische Behandlung der Pulpakrankheiten des Zahnes, mit Beitraegen zur Lehre von den Neubildungen in der Pulpa."

Some of the views of the author were criticised, but in the main the book was commended and the desirability of having it translated into English was expressed.

Hunter's "Mechanical Dentistry" was next considered. Some of the methods advocated were new to this country. There is little in it that is not valuable, and it should be in the hands of every one engaged or interested in dental operations.

Stocken's "Dental Materia Medica and Therapeutics" and Baume's "Manual of Dental Surgery" were also noticed and commended.

Legros and Magitot's "Origin and Formation of the Dental Follicle," translated by Dr. M. S. Dean, is the best treatise on the subject that the writer of the report has seen. The translation, to which is prefixed an introduction of forty-five pages on the "Mucous Membrane," is in the form of a dialogue between a preceptor and his pupil. It was warmly commended to the profession.

The report concluded with the hope that in the future our literature should give evidence of a growth and development equal to any other agency that goes to make up our profession.

Dr. C. F. W. Bödecker, New York. I have a few words to say about Mr. Witzel's work. I think he has made a good many mistakes. With regard to the remarks concerning the use of arsenic, I cannot agree with him, as I do not think its action is merely superficial. I can hardly believe that Mr. Witzel has seen the preparations as they are illustrated, for by his method of preparing and mounting the specimens he would be able to see only the periphery of the pulp, and the conclusions are therefore more in the nature of hypotheses than ascertained facts. He also says that no pulp can be saved by an oxychloride capping. I have a relative for whom I, about seven years since, capped a pulp with that material. Two years later the capping was removed, and the pulp was again capped with creasote and zinc oxide, afterwards filling with oxychloride of zinc. About a year since, when I again examined the tooth, it was still in good condition, although not covered with secondary dentine. Mr. Witzel, I believe, is under the impression that we in America cap exposed pulps with nothing else but the oxychloride of zinc. The drawings are beautifully executed by Dr. I. Heitzmann, of Vienna, but too diagrammatic. I have as yet not been able to see an artery in a pulp, as illustrated, though I will not say there may not be one. As I have examined only a limited number of sections of pulps, perhaps not more than twenty, I am unable to positively deny the existence of larger vessels than capillaries within that organ.

In reply to a query as to there being blood-vessels in the pulp, Dr. Bödecker stated that he had so far only met with capillaries; but when some experiments he is now conducting are completed he will be able to say whether or not there is an artery in the pulp.

Dr. J. G. W. Werner, Boston. How could we have pulp palpitation, as I have seen it three times, just as well as at the radial artery, every time the heart beat, unless there is an artery in the pulp? I think it a necessity that there be arteries in the pulps.

Dr. E. A. Bogue, New York. Dr. Atkinson squelched the First District Dental Society by speaking of the "exploded notion" of there being arteries in the pulp. I would ask Dr. Atkinson or Dr. Bödecker or Dr. Heitzmann, whoever of them has investigated the subject, what they apply the name artery to? If it must have three coats or two or one?

Dr. Bödecker. An artery has a distinctly-visible muscular coat. I have not seen one in the pulp, though I will not say there is none. Arteries go into the pulp and divide right away on entering it. As I make sections of a pulp, I might just have lost the part which contained the artery.

Dr. Bogue. Have fœtal pulps been examined?

Dr. Bödecker. Yes, a few of them, and a number of arteries are seen extending to the base of the tooth, but on entering the pulp-chamber they are seen only as capillaries.

Dr. Bogue. If it enters the pulp for some distance it may become capillary.

Dr. W. H. Atkinson. Dr. Bödecker is not dogmatic enough in asserting what he knows. There is not an embryologist who will take the ground that there are three coats on the vessels in the pulp. The large vessels in the pulp are sinuses, as shown in embryological investigations. If we would go to Nature, instead of to France or Germany, for our facts, we should come nearer the apprehension of truth. Dr. Atkinson invited those who doubted to come to his house and be convinced. Did any one ever see an artery enlarge in its course from the heart, as would have to be the case if the large vessels in the pulp were arteries? Why, if they are arteries, is their bleeding stopped by burring down upon them? Dr. A. denounced Witzel's work, stating that he had seen the arsenic, which this learned gentleman says has only a limited power to destroy, applied to the web of a frog's foot, and the whole body of the frog was not only killed outright, but preserved so as to be a monumental testimony of the power to kill not only a very limited portion of the tissue to which it was applied, but to kill and preserve it from disintegration to the outermost "limits" of the entire organism.

In 1866 I had a very interesting case of exposure of the cornua of the pulp of an inferior first molar. There was much discussion among the class then under instruction as to the possibility of preserving alive any pulp which had bled. To elucidate, the following case is cited: the pulp with four cornua exposed was covered with oxychloride of zinc. Three of them were protected by secondary dentine, while the fourth, which was uncovered a number of times to show the manner of calcific deposit, finally died from the effects of the frequent exposures. If you want any light on histology, don't translate Witzel.

Dr. Atkinson then read the report on "Nomenclature and Terminology," which was a continuation of the report submitted last year, opening with a suggestion for the improvement of the spelling of one of the varieties of universal form given in the last year's report, and submitting an enlarged list of terminations. No fair impression of the report could be given in an abstract; therefore none is attempted.

Adjourned.

THIRD DAY—*Morning Session.*

The association was called to order at the usual hour, President McKellops in the chair.

On motion of Dr. M. S. Dean, it was determined to hold an extra session at four o'clock P.M. for the election of officers and the selection of the place for holding the next annual session.*

Dr. Taft, of the committee appointed to consider the suggestions contained in the president's annual address, reported that some of them had already been disposed of by the action of the association. In regard to the encouragement of inventors of new appliances, that would be taken care of by the law of supply and demand in the course of business. The committee would suggest that copies of the transactions, when printed, be sent to such public libraries as may be designated by the association. In regard to the concentration of the strength of the profession into one national body, instead of dividing it among three as now, the committee suggested that the association take definite steps looking in that direction.

Dr. Shepard moved to strike out of the report after "public libraries" the words "as may be designated by the association," and insert "as may be selected by the Publication Committee." The amendment was accepted, and the report as amended was adopted.

The Third Section, Dental Literature and Nomenclature, was declared open, and

Dr. Atkinson discussed the report on "Nomenclature and Terminology," which he had read the evening before. Discrimination is the first requisite in discussing any subject. Ideas are always presented in an unpronounced aspect at first. Words have been used so indiscriminately that two sides could always be taken on any question. In the hope of arriving at the basis of fundamental activity, the section has labored arduously in going to the last foundation. All past effort has been satisfied with a substitute for the foundation. Sound is the basis of all speech. Sound has nine distinct embodiments; or, to put it another way, there are nine distinct articulate sounds of which the human voice is capable. Besides these there are twenty-four inarticulate sounds, or stops to articulation. We must have a starting-point from which to begin, and that starting-point in the material world is the atom. Dr. Atkinson referred to a diagram on the blackboard which was, he said, remarkably adapted to illustrate histological evolution. First in the series is the point,—an unpronounced atom,—which has neither length, breadth, nor thickness, and represents mere position in space. Following it is the atom, the least pronounced portion of matter as a concept. Next in the scale is the molecule, a flock or irregular collection of points, like the atom unrecognized by our visual sense. In the next step we have the granule, the first visible body under the lens. This is in turn succeeded by the unpronounced corpuscle, indicated by a pivoted or nucleated flock of thin or light atoms, to which succeeds the pronounced corpuscle. And so on through the series, which consisted of seven steps, each step having two divisions. Dr. Atkinson called attention to the fact that in the terminology represented advancing complexity of organization was accompanied by increasing difficulty of pronunciation, and concluded by returning thanks for the attention with which the report and his subsequent remarks had been received.

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* The report of the extra session has already been published. See DENTAL COSMOS, September, p. 513.

Dr. H. A. Smith, from the committee appointed to prepare resolutions on the death of Dr. McQuillen, reported as follows:

> The father of this body has been called from labor to rest. Although we cannot see him by the use of our outward eyes as present among us, beholding our good behavior, rejoicing in our progress,—nevertheless he doubtless is still with us in spirit and purpose to assist in accomplishing the completion of the work so wisely begun by him while yet in the flesh among us. We mourn for ourselves in being deprived of his wise counsels and co-operation; but we rejoice for him in that he is no longer amenable to the sorrows of misunderstanding and mental difference. May we all emulate his example of untiring effort for the upbuilding of our knowledge and efficiency in the great work for which this body was instituted! Though out of sight, nevertheless we feel him near to us all in harmonious fellowship in our work.
>
> H. A. SMITH,
> W. H. ATKINSON,
> M. S. DEAN,
> *Committee.*

Drs. Rehwinkel, Barrett, Spalding, Stellwagen, Beck, and Atkinson, delivered eulogies on Dr. McQuillen, after which the report was unanimously adopted by a standing vote.

The president announced the following Committee on Directory, appointed under the resolutions offered by Dr. McNaughton:

D. C. McNaughton, chairman, Jersey City, New Jersey.
Maine.—Thomas Fillebrown.
New Hampshire, Vermont, and Massachusetts.—W. E. Paige.
Rhode Island.—C. A. Brackett.
Connecticut.—J. McManus.
New York.—S. A. Freeman.
Delaware.—J. E. Register.
Pennsylvania.—G. W. Klump.
Maryland.—F. J. S. Gorgas.
District of Columbia.—R. Finley Hunt.
Virginia.—J. H. Moore.
West Virginia.—D. B. McLain.
North Carolina.—E. Floyd.
South Carolina.—T. T. Moore.

Florida.—R. F. Phillips.
Georgia.—G. W. H. Whitaker.
Alabama.—E. S. Chisholm.
Mississippi.—J. D. Miles.
Missouri.—J. G. Harper.
Louisiana.—G. J. Friedrichs.
Texas.—J. A. Tulloss.
Arkansas.—E. Collins.
Kansas.—A. H. Thompson.
Tennessee.—H. W. Morgan.
Kentucky.—A. O. Rawls.
Ohio.—A. F. Emminger.
Indiana.—S. B. Brown.
Illinois.—A. W. Harlan.
Michigan.—George L. Field.
Wisconsin.—Arthur Holbrook.
Minnesota.—D. C. Price.
Iowa.—L. C. Ingersoll.
Nebraska.—T. C. Kern.
Colorado.—J. C. Fuller.
Nevada.—W. O. Conwell.
California.—William Dutch.
Oregon.—S. J. Barber.
Territories at Large.—E. T. Darby.

The Fourth Section, Operative Dentistry, was called, and Dr. G. C. Daboll read a report prepared by Dr. I. J. Wetherbee. The report, after referring briefly to the diversity of methods of practice, stated the conclusion that there is a dearth of scientific knowledge requisite for the skillful practice of dentistry, and proceeded to review the "New Departure," the design of which is to teach a principle which shall indicate lack of knowledge as the cause of "failure in operations," instead of attributing it to defective manipulation. Because teeth again decay after having been well filled are we to infer that the chief factor in this newly-recurring disaster is a want of compatibility? Is it not true that dentists have been eclectic in their practice? Have they not used amalgam, the oxychlorides, and tin foil when in their judgment the usefulness of the tooth could best be preserved thereby? It is generally well known that gutta-percha will preserve a tooth as long as it remains intact, but the frequent repair to which the "New Departure" system subjects patients will aggregate in a decade a larger expense than if they had been filled with gold in the first instance. In this report the writer claimed to voice the general sentiment of dentists as far as he had been able to obtain their views. It is understood that although cavities in teeth may be filled perfectly, we have little or no control of the causes which first produced the destruction of the tissue. So far as known, there are few converts to the "New Departure."

The report briefly summarized the views of contour operators, who build up with gold to nearly or quite the normal size, with their claims; divided those who practice separation into two classes, the radical and moderate separatists, the former of whom cut away good and poor tissue alike, leaving the teeth in a sadly demoralized condition. In poor teeth this practice is justifiable, as the teeth could only be saved by this method. The more moderate separatists are careful to secure a sufficient general separation and give a wider space on the lingual proximate surfaces to make the spaces self-cleansing. This practice is to be commended where conditions indicate it.

As to bleachants, chlorinated lime has fallen into disuse, because, although at first satisfactory, future results do not justify its application. Chloride of sodium is open to like objections from the effect produced on the calcareous portion of the dentine. Strong spirits of camphor is an excellent bleachant, and is very effective, in a short time dissolving the pigment within the cells as well as permeating the hard tissue. So much of the dentine as may be safely removed should be. The spirits of camphor should be applied for such time as may be requisite. Then fill the root with gold in all cases. Fill the cavity with great care and thoroughness, and you will be pleased with your success.

There is nothing new as to the best mode of extracting, nor a more effectual method of treating salivary calculus, nor a surer way of disposing of alveolar abscess than those generally practiced. The practice of extracting and replanting teeth for the cure of the latter disease is objectionable, and should be abandoned.

The report was accompanied by a statement that the majority of the section dissent from the view advanced in the report that all roots of anterior teeth should be filled with gold, believing as they do that other materials may be used more easily and with equal success; also, the majority of the section regard replanting for the cure of alveolar abscess as good practice in certain extreme cases.

Dr. George B. McDonald, Conneautville, Pennsylvania, also read a paper devoted to the causes of failures, and methods of treatment, entitled, "Proper Management of Proximate Surfaces of the Teeth."

Nine-tenths of all our failures are the result of imperfect operations on the proximate surfaces. "Now, if by discussing the management of proximate surfaces, and having practical demonstrations, we can be so illuminated and qualified as to enable us to reduce the ratio of failures to one in ten, instead of nine in ten, we shall certainly be amply rewarded for our labors." For the purpose of illustration, he would describe the proper preparation and filling of the proximate surfaces of a right upper central incisor and a right superior first bicuspid, where the cutting edge of the one and the masticating surface of the other were involved, both teeth having been previously filled. On examining the incisor we find the causes of the failure of the original filling to have been,—1st, we did not have room enough laterally to fill properly; 2d, we did not properly anchor the fillings in the cervical, palatal, and labial walls of the tooth; 3d, we did not bevel the margins of the cavities thoroughly, especially at the cervical margins; 4th, we packed our fillings at the cutting edge in enamel which shows checks, which caused the edge to split off when exposed to the force of biting hard substances; 5th, too large pieces of gold were used, and they were not perfectly impacted; 6th, the gold was not finished down perfectly even, especially at the cervical margin. The tooth should be wedged apart from the adjoining tooth from one-sixteenth to one-eighth of an inch, and kept in that position for a week or more, or until all soreness has subsided. After applying the rubber dam, cut away with a properly-shaped corundum wheel the portion of the cutting edge yet remaining between the cavities in the mesial and distal surfaces, as may be required; then cut retaining grooves through the cutting edge, extending them to the cervical, labial, and palatal walls, and bevel the entire orifice of the cavity, removing every portion of disintegrated tissue, polishing off the external margins, and clearing out carefully all *débris*. Fold a strip of No. 4 cohesive gold four times, and cut into strips one-sixteenth to one-eighth of an inch wide; anneal one of these strips, and with a hand instrument anchor it in a starting-point made along the cervical wall; then, with a properly-shaped plugger, adjusted to the electro-magnetic mallet, proceed, slowly and surely, perfectly to pack the strips of foil against the walls of the cavity, until the form of the tooth is restored to its original contour, taking care that the density is perfectly uniform in every part. Finish the filling with separating saws, files, and strips of No. 0 emery-cloth, trimming off any overhanging gold, especially at the cervical margin.

On examining the bicuspid, we find a portion of the gold gone and the tooth-structure extensively decayed, so that the rest of the filling would fall out but for the adjoining tooth. In addition to the causes of disaster to the incisor, we find two others,—an organic fissure on the grinding surface, which should have been opened into, and the two proximate cavities connected through it. Had this been done, the saliva and other destructive agents would not have gained entrance under the fillings. The pieces of gold were too large, and were made up of cylinders, pellets, and ropes of gold twisted up with the fingers, which should never be done. The fillings are also found loosely pressed against each other, without any absolute cohesion,—the condition which must be secured to get the best results. After wedging the same as in the case of the incisor, we prepare the cavity, and when nearly ready we have a compound cavity extending from the cervical wall on the mesial surface through the fissure to the cervical margin on the distal surface; but the walls are so thin to about one-eighth of an inch from the end of the cusps that there is danger that they may break, especially as the cusps of the tooth and its antagonizer are long, experience having taught that with this condition one or both may be split off, and the operation prove a failure. We accordingly cut off the cusps to the point indicated, and make a starting point in the cervical walls, and anchoring-grooves along the palatal and buccal walls, taking care that all disintegrated enamel at the surface where the gold and tissue are in contact is thoroughly removed; then fill and finish as before indicated. The adjoining teeth should knuckle up to the gold so as to come into perfect contact.

Dr. McDonald likened the method of operating just described to a barrel hooped with iron, while in comparison for actual worth, a barrel hooped with wrapping twine would stand for the ordinary method of filling front and extensively decayed teeth with cylinders, pellets, and ropes twisted up with the fingers, and packed with the automatic mallet or hand-pressure instruments. A tooth filled in the manner he had described will stand any necessary force. There are ten failures for the want of cutting away enough frail tooth-structure to be replaced with gold, to one caused by too much cutting.

Thoroughness of preparation and execution, taking plenty of time for the work, is the basis for success. Hasty work is usually very imperfect work, while operations upon which sufficient time is spent are far more likely to be successful.

Dr. T. H. Stellwagen, Philadelphia, read a brief paper on "The Natural Dentine for Capping Pulps of Teeth." Referring to well-known operations in surgery,—the transplantation of portions of the epidermis to assist in forming healthy cuticle, of small portions of bone or periosteum to act as centers of calcification,—it had occurred to him to attempt to assimilate the pulp-covering to the natural material. Why not therefore use tooth-structure? The method which he had adopted to secure this had for eighteen months resulted successfully. It is when the pulp is exposed to wait till the wounded surface is glazed over. Then with a sharp excavator shave off enough of the healthy dentine of the tooth to cover the point of the bare pulp. He does not remove any of the powdered dentine, but proceeds to cover with the capping material. He does not think that dentine from dead teeth could be used successfully, because when the dentine for covering is taken from a tooth in the head, we get matter which is living, and tissue so low in organization as dentine does not die so soon as to render its use in such cases undesirable.

Dr. G. J. Friedrichs, New Orleans, read a paper on "Erosion of the Teeth and its Local Treatment," referring to it as a subject that has received little attention in proportion to its importance. He finds that about ten per cent. of the patients who come to him for dental services suffer more or less from erosion. Dr. Friedrichs's paper pronounced the disease a species of caries of the enamel, usually appearing in several teeth at a time, described the appearance of teeth affected by it, and catalogued the teeth in which it is oftenest seen. His treatment was based on the fact that the vital forces are ever on the alert, requiring only to be directed aright to work a cure. The agent to bring this about is nitrate of silver. His theory of the manner in which its curative action is brought about is that when the nitrate is brought in contact with the saliva oxide of silver is deposited, and acts as a protection to the tissue against the disintegrative action of the saliva. A chip of the stick nitrate or a crystal can be used, moving it about over the surfaces of the teeth involved until it is decomposed. If after a week the sensitiveness is not allayed, the nitrate must be applied again. There is no danger in its use, as its action is entirely superficial. After a few applications a thin film is formed, which is allowed to remain until after structural consolidation takes place, after which it is scraped off and the surface polished. Constitutional remedies are also to be employed.

Dr. R. Finley Hunt, Washington, has been investigating the character of the secretions of the mouth. Erosion is caused, he believes, by alkaline, instead of acid conditions of the secretions of the mouth. He questions if the normal secretions do not in combination produce a neutral condition. Has found in some mouths, while the general character was acid, that in some parts of the mouth the litmus paper showed an alkaline reaction of varying intensity. Teeth exposed to these conditions sometimes eroded rapidly for a period, and then the disintegration ceased suddenly. This stoppage was no doubt due to the pathological condition of the excretory glands ceasing to exist. We should always diagnose our cases carefully, so as to be able to look after the systemic condition. Dr. Hunt gave instances of cases of general decay coming under his care which yielded to systemic treatment.

Dr. E. T. Darby, Philadelphia, saw nothing new in Dr. Friedrichs's paper on erosion. He had himself treated it with nitrate of silver for years. Its use, however, is objectionable in that it will cause discoloration, and the erosion will go on unless the nitrate is applied frequently. He directed attention to the galvano-cautery introduced to the notice of the profession by Dr. Salmon for sensitiveness of teeth, which had been found to answer its purpose well, though it could not be applied in difficult cavities.

The views expressed in Dr. Stellwagen's paper are new, but he cannot see that there is much in the suggestion that will prove of value to us. He should prefer, in employing that method, to scrape the dentine from a tooth already extracted; is of opinion that dentine introduced in the manner directed will produce irritation. He should be very careful where he applied it and how much he applied. May not Dr. Stellwagen's success be due to the gutta-percha covering with which the exposure is capped? He (Dr. Darby) has succeeded in ninety per cent. of cases in capping recent exposures, using first the oxide of zinc, and following with the oxychloride.

The "New Departure" has received as much public attention as it should. Lazy men have adopted it as requiring less labor than the insertion of fillings of gold. In Philadelphia we don't take very much stock in it, and the man who advocates its principles does more harm than good.

Dr. E. Osmond, Cincinnati, commended the use of nitrate of silver in erosion; he had described his method of applying it several years since. He does not like the use of the stick or crystal. His method is to drop a small portion in a dish of paraffin; then apply it by means of cotton twisted around a bit of orange wood, rubbing it over the affected surface. He does not believe its curative effect is due to its escharotic action, but to its union with the albuminous portion of the dentine. We must use only enough to produce this result,—not enough to destroy the tissue. He also uses the nitrate in *pyorrhœa alveolaris* with good results. After cleansing the teeth he applies it to the soft tissues. In regard to Dr. Stellwagen's paper, he cannot see any analogy between the process described and skin-grafting. Dr. Stellwagen's success is doubtless due to the materials used for capping.

Adjourned.

ODONTOLOGICAL SOCIETY OF PENNSYLVANIA.

The annual meeting of this society was held on Saturday evening, May 3, at the residence of Dr. H. C. Register, 1907 Chestnut Street. As the present officers were elected at the first meeting in February, it was deemed inexpedient to hold another election. It was therefore resolved that they be retained in office during the ensuing year.

The following preamble and resolution were adopted:

Whereas, This society appreciates all efforts made in behalf of the profession to originate and improve instruments, etc.; therefore,

Resolved, That it will be pleased to make record of all original matter pertaining to the practice of dentistry, such as superior materials for filling, modes of manipulation, useful instruments or mechanism; and as a scientific body will extend to such originators its sympathy and protection: Provided, applicants deposit specimens, models, or specifications with the librarian, and demonstrate the same before this society, or a committee, as the society may elect, with satisfactory evidence of originality, and afterwards submit the same to a standing committee for approval.

Drs. E. T. Darby, F. M. Dixon, and H. C. Register were appointed the standing committee for the ensuing year.

Dr. E. H. Neall presented to the society a modification of the Tees clamp with mirror attached for aiding in excavating and filling cavities. AMBLER TEES, D.D.S., *Recording Secretary.*

A stated meeting was held Saturday evening, June 7, at the office of Dr. Daniel Neall, 1627 Summer Street.

Dr. Marshall H. Webb, of Lancaster, read the following paper:

"THE ACCEPTED CREED"—PROPER PRACTICE.

When the "creed of the New Departure" was announced at the meeting of the New York Odontological Society, November 20, 1877, the following so-called accepted one was also presented as the "time-honored and ordinarily 'accepted creed'":

"ACCEPTED CREED" (so-called).

ARTICLE I. "Gold is the best thing to save teeth."

ARTICLE II. "Some have faith in contour, others faith in separation."

ARTICLE III. "Failure in operations is mainly due to defective manipulation."

ARTICLE IV. "A tooth that is worth filling at all is worth filling with gold."

ARTICLE V. "Unskilled and unscrupulous dentists fill with tin covered with gold, thereby causing galvanic action, pulpitis, death of the pulp, abscess, and loss of the tooth."

ARTICLE VI. "A filling to be good, must not leak."

ARTICLE VII. "Gutta-percha, properly used, is good enough for temporary fillings."

ARTICLE VIII. "A good gutta-percha filling in its proper place is better than a poor gold one."

ARTICLE IX. "Amalgam, *per se*, is a poor filling material."

ARTICLE X. "The use of plastic filling materials tends to lower the standard of dentistry, thereby diminishing its sphere of usefulness."

Many parts of this creed are not approved by first-class practitioners, nor is it "ordinarily accepted."

The best operators are guided by the principles stated in the following ten articles, and these indicate the proper or accepted practice. Since these notes refer not only to the "Accepted Creed," but to that of the "New Departure" also, it may be well to give each article of this creed with that of the proper practice:

Article I. New Departure.—"In proportion as teeth need saving, gold is the worst material to use."

Article I. Proper Practice.—Gold, properly and skillfully used, is the best material known for restoring the teeth to usefulness, and for their permanent preservation.

Article II. New Departure.—"We do not believe that either" (contour or separation) "has much to do with the final result."

Article II. Proper Practice.—Restoration of the contour of missing tissue, when the whole operation has been carefully and thoroughly performed, and the gold finely finished, is the best, nearest perfect, and highest style of operation for the preservation of the teeth.

Article III. New Departure.—"Failure in operations is mainly due to incompatibility of filling material with tooth-bone."

Article III. Proper Practice.—"Failure in operations is mainly due to defective manipulation." If gold be perfectly impacted against dentine and enamel, and its surface smoothly finished, fluids and semi-solids cannot enter between the material and tissue against which it is placed—and without moisture no chemical action can take place—and there cannot, therefore, be the least "incompatibility" between the gold and dentine and enamel.

Article IV. New Departure.—"A tooth that can be so treated as to be satisfactorily filled with anything is worth filling."

Article IV. Proper Practice.—With the aid of the rubber dam a tooth, or a part of a tooth, that can be operated upon at all can be filled and saved with gold, provided the operator has the ability, and if he has not then he ought to use that material with which he can best succeed.

Article V. New Departure.—"SKILLFUL and SCRUPULOUS dentists fill with tin covered with gold, thereby PREVENTING decay and pulpitis, and thereby saving the tooth."

Article V. Proper Practice.—Skillful operators or first-class practitioners perform operations with gold (and for a time and occasionally with other materials) so as to prevent disintegration, irritation or death of the pulp, abscess, and loss of the tooth or teeth operated upon. When the tissues are diseased operators of this class aid nature to get the parts in normal condition, and then fill and save the organ.

Article VI. New Departure.—"A filling may be the best that is known for the tooth, and yet leak badly."

Article VI. Proper Practice.—A filling to be first-class "must not leak." Where the operator cannot insert gold perfectly so as to make the filling moisture-tight and the operation permanent, he should use in the incisor and cuspid teeth a cement or gutta-percha; and in the bicuspids and molars tin foil, that oxidation of the metal may take place at parts where fluids are not excluded, the oxide formed assisting "to arrest decay."

Article VII. New Departure.—"Gutta-percha, properly used, is the most permanent filling material we possess."

Article VII. Proper Practice.—"Gutta-percha, properly used," is a very good material for temporary fillings, and where there is no friction from mastication, or from the free use of the tooth-brush and floss-silk, it may prevent decay for several years, or as long as it remains in place.

Article VIII. New Departure.—"A poor gutta-percha filling, in its proper place, is better than a good gold one."

Article VIII. Proper Practice.—"A good gutta-percha filling, in its proper place, is better than" a very imperfectly inserted one of gold or any other material.

Article IX. New Departure.—"Amalgam, *per se*, is an excellent filling material."

Article IX. Proper Practice.—Amalgam, *per se*, is not a good filling material, yet, if an operator cannot so insert any other as to save the tooth, it were better to use this than to extract the organ. Amalgams leak, oxidation takes place, and this, to an extent, checks or retards decay negatively; the surrounding tissue becomes discolored (especially the dentine in the teeth of young persons), causing an unsightly disfiguration; to which is to be added, the breaking away from time to time of portions of enamel from the margins left unprotected by the shrinkage or contraction of the alloy.

Article X. New Departure.—"The use of plastic filling materials tends to lower that dentistry which has for its standard of excellence ability to make gold fillings, but very much extends the sphere of usefulness of that dentistry which has for its standard of excellence ability to save teeth."

Article X. Proper Practice.—The use of plastic materials does not tend to that careful preparation and the development of that manipulative ability which is absolutely necessary for one to possess before he can truly be a fine operator or first-class practitioner throughout. The "standard of excellence to make gold fillings" is to properly perform and finish operations so that if an operator can do this he can save all the teeth of his patients with gold—in connection in some cases with oxychloride of zinc to prevent shock from thermal currents. If a practitioner of the first class deems it well to use an alloy or any other material, he can do so more successfully than one who has not ability to perform operations perfectly with gold.

Discussion.

Dr. Darby. I do not profess to be an authority upon this or any other subject, but I do feel that it is one of great interest to every practitioner of dentistry. The teachings of the so-called "New Departure" have had and will continue to have great effect upon many in the profession. The tendency of such teachings is to make slovenly, careless operators. If I tell a student or practitioner of dentistry that amalgam, gutta-percha, or other plastic materials are as good or even better than gold, the danger is that he will use them instead of gold in many cases where gold should be used. It is not all men who are capable of judging when a tooth should be filled with gold or with some plastic filling. The teachings of Flagg and others are dangerous, and to promulgate them cannot but be attended with great harm to the beginners in dentistry—especially harmful if taught in our dental colleges. I have recently had some correspondence with Dr. Barrett, of Buffalo, New York, whose paper, in answer to the creed of the so-called "New Departure," is, in my judgment, the best which has appeared. Dr. Barrett meets the subject fully and squarely, and it seems to me his arguments are convincing. He tells me that the tendency with country practitioners is to use more amalgam and slight that part of dentistry which requires the greatest amount of skill in its performance. My observation has been that amalgam and gold may be used in the same tooth, and in immediate contact, with no unfavorable results, notwithstanding the theories which have obtained to the contrary. I saw but a few days since a tooth which had been largely filled upon one proximate surface with gold, and upon the masticating and other proximate surface with amalgam—the two fillings meeting—without the slightest injury being done to either tooth or fillings. Experiments in the laboratory and experiments in the mouth do not always bring about the same results.

Dr. Essig. I should like to know the experience of the members respecting the consequences of filling two proximate cavities respectively with gold and amalgam, contact of the two being permitted.

Dr. Darby. I should not have allowed them to touch.

Dr. Essig. The statement is often made that where the same cavity is made to contain both gold and amalgam in contact no electro-chemical action takes place; and, if I am not mistaken, it has been claimed that such combination preserves the tooth better than gold alone. I do not understand how this can be the fact, and am inclined to think that gradual solution of the amalgam, assisted by a weak electrical current, does go on in all such cases; and I am strengthened in this belief from the fact that wherever I have seen amalgam joined to gold, the surface of the former had the appearance of having been acted upon by an acid, and was not bright even when on the masticating surfaces of the teeth, as is the case generally with amalgam fillings when not in contact with another metal.

Dr. Jack. Recently I filled two teeth, one with gold and the other with amalgam. The latter tooth was highly sensitive, and it was impossible to fill it immediately with gold. The fillings were not in direct contact, but near each other. I find there is disintegration in the walls of the teeth, and abrasion and discoloration of the amalgam, and, to some extent, disintegration of the enamel tissue at the inner portion of the cervical wall. I have always avoided the association of tin and gold. I understand that Dr. Flagg claims that the relation of the two is the salvation of the tooth. What we want is a careful, minute examination into electro-chemistry. No one is engaged in it but men who have a personal pecuniary interest in it, except, perhaps, Dr. Palmer, who, as far as I know, has no pecuniary interest in it. All men who are falling away from manipulative ability will lean on plastic materials, but it is an unphilosophical way of dealing with the subject. The question is, What material is the best to preserve the tooth? As far as the old creed is concerned, Dr. Flagg has expressed it well. That is not the accepted creed of a few individuals, but of a large proportion of the profession. As far as my sentiments go, gold, *per se*, is the best material, and the only disqualification is the difficulty of performing good operations with it.

Dr. Dixon. I would ask Dr. Jack if he means to say that gold is the only thing that has been found to save teeth permanently.

Dr. Jack. If we had a material that was free of all objections I would at once discard gold, and we would all be fools if we continued to use gold.

Dr. D. Neall. Dr. Woodward has been complaining of the non-uniformity of the gold.

Dr. Darby. Gold-beaters complain about the atmosphere affecting the working properties of the gold. There are certain conditions of the atmosphere when it is almost impossible to produce good working foil.

Dr. Essig. Gold-beaters experience trouble from the action of the atmosphere upon the molecular arrangement of the gold. This is probably what Dr. Woodward complains of.

Dr. D. Neall. My father put a tin filling in one of my teeth. One day I put a five-cent piece in my mouth, and it gave me a shock. This first gave me an insight into galvanic action. I think the question of our possibly starting galvanic action in the mouth need give us no anxiety. If we start it, we can also stop it. So in regard to electro-chemical effects. In a long practice I have seen nothing in that direction to deter me from the use of amalgam in connection with gold. For fifteen years I have been in the habit of patching large compound gold fillings with margins of amalgam, especially at the cervical borders and where it was out of sight and the cavity difficult of access, and I find they are as closely united as if made of but one material. Many years ago I inserted a small plate for a gentleman. Recently, having lost other teeth, I put a clasp around his lateral incisor. It held nicely, but that lateral had a large, shallow cavity in it, which I thought I would fill with amalgam instead of gold. He came back to me and said that he had a galvanic battery in his mouth. I put a piece of silk string around the tooth, when the galvanic action ceased. Six weeks ago I placed an amalgam filling in a large superior molar. A few months before I had filled it with gutta-percha, which had worn out. The lady was wearing a plate with a clasp around this tooth. She came back complaining of a shock. I wove silk around the clasp, but she still complained of the pain. I then cut off the clasp, and have not heard from her since. I recently saw a large amalgam filling which extended up beyond the margin of the gum, which I placed in the cavity some time ago. There was a gold filling in the middle of the amalgam, at the cervical margin.

Dr. Darby. Was the amalgam filling of which you speak unduly oxidized?

Dr. D. Neall. It was of a dark color, as we generally find Townsend's amalgam.

Dr. Bonwill. I believe I have not heretofore publicly expressed my opinion upon the principles of the "New Departure." My experience in practical dentistry and in electrical experiments will not allow me to adopt this new theory. To give my reasons therefor would require an essay. To totally deny gold a place in filling materials is almost too bold. Much as I have cursed the results of gold fillings, I am not blind to the fact that they are from bad manipulation and the use of it when other materials would have been better. I think if the advocates of this theory would resort to the means now at our command to enable capable men to insert gold fillings, they would find no necessity for a "New Departure." I have never yet seen a tooth decay that was filled well with gold; but if the smallest leak be left decay will occur. The advocates of this theory lose sight of one important factor in the play of caries. If the best amalgam filling of contour surface be brought in contact with tooth-substance on the proximate wall of the contiguous tooth, and this contour surface of metal be as close as in nature, without any room for cleansing, these proximate surfaces will form a capillary tube to suck up the starchy elements in the saliva. If on the buccal and palatal walls of the cavity the enamel be not cut boldly away, to so separate those walls that no food may be held by capillary force, then the filling will fail, and would fail if it were gold. It is not galvanic, but chemical action from starch, induced by capillary action, which causes decay in tooth-substance wherever it is permitted to continue, whether before or after filling. *First*, I advocate anticipation; *second*, when this cannot be done in time before caries has begun, contouring must be resorted to in all teeth posterior to the cuspidati.

Dr. Darby. Have you stopped making permanent separations between the teeth?

Dr. Bonwill. No, sir, I have not abandoned anticipation. If gentlemen will honestly try the plan I advocate, and not judge of it without either having tried it or seen its results, then there will be some excuse for the opposition to it.

Dr. Dixon. I have seen but little that could be called galvanic action, or its effects, arising from the presence of two or more metals in the same mouth. Although I believe from the statements of others that it does take place, yet I have come to look upon mischief from that cause as almost mythical, having never noticed injurious effects of any kind that could be traced to it. I have seldom if ever added amalgam to gold fillings, but I have often patched amalgam with gold, obtaining excellent results. I will cite a case in point. The posterior proximate surface of an inferior bicuspid had decayed all over, but being too sensitive to admit of cutting retaining-points in it, I filled it with amalgam. From time to time as the tooth decayed I patched it with gold, until the whole filling, except cervically, was and is circumscribed with gold, since which no decay has taken place. I have treated teeth in other mouths in the same manner with the best results. I have repeatedly refilled teeth with gold where amalgam has signally failed.

Dr. Essig. Dr. Dixon once showed me a mouth in which frail teeth were all filled with gold, and told me that in that mouth amalgam was poisonous. Will Dr. Dixon tell me what he meant by that?

Dr. Dixon. It was an inadvertent expression. I have met with a number of cases where amalgam seemed to act as a solvent,—dissolving, as it were, the tooth-structure at the periphery of the filling, and to some extent wherever it came in contact with it.

Dr. Jack. May I ask Dr. Dixon if in that mouth the gold fillings preserved the teeth when the amalgam did not?

Dr. Dixon. Yes, sir! the gold fillings preserved them admirably. Here let me remark in regard to the teachings of the "New Departure," that they are doing incalculable mischief. A great many well-meaning practitioners, some of them very capable men, are swayed by them and led astray. Most, if not all of us, have been in the habit all along of using the materials recommended in the "New Departure" and approving of them to a limited extent, especially where good gold fillings are impracticable. We should not be too ultra in either direction, but eclectic, and certainly progressive.

Dr. Webb. I do not know that Dr. S. B. Palmer lays any special stress upon the so-called incompatibility of gold with dentine, but he has several times stated that for chemical action to take place and currents to be started about any metallic filling there must be leakage. He states that where there is no leakage there is no action. Dr. Palmer's opinions and theories should receive proper consideration because he is an earnest and conscientious investigator, and I do not think is interested in the manufacture or sale of an alloy or other material. Those thus interested cannot well give an unbiased opinion; neither should they assume to be teachers who cannot so perform operations as to make fillings moisture-tight. The rubber dam can be applied, though with difficulty in some cases, and gold can be so inserted and finished at the cervical wall and other parts as to prevent fluids from entering between it and the dentine and enamel against which it is placed. Dr. Palmer has suggested that tin be placed at the cervical wall, where there is difficulty in so placing gold as to make the part moisture-tight, because tin becomes oxidized, and this oxide of tin closes the breach, is an antiseptic, and assists in arresting decay. Where an operator cannot insert gold so perfectly as to make the filling moisture-tight it will probably be best for him to use tin foil, that it may become oxidized at those parts where the filling does not exclude fluids, and that the oxide may be present "to arrest decay." One who has not the ability to properly perform any operation with gold may resort to plastic fillings. In reference to the case stated by Dr. Dixon, I would say that he evidently did the work so thoroughly that no leakage could occur between the gold and the tissue against which it was placed; whereas after a time—perhaps a year or two—shrinkage of the amalgam took place, and leakage ensued sufficient to admit the agents that brought about disintegration; hence the failure of the amalgam fillings of which the doctor speaks. I have seen like cases, and these prove the "incompatibility" of amalgam with "dentos." Dr. Dixon states that he inserted gold as well as amalgam fillings in the case he mentioned, and this indicates that the teeth were such as to be readily acted upon by destructive agents—calcification had not taken place in the polyhedral fields of the enamel-rods and throughout the dentine.

Dr. Bonwill. In regard to uniting amalgam with gold in a tooth or in contiguous teeth, I was disposed for a long time not to so use it, fearing trouble from galvanic action; but results observed led me to try it where a good gold filling was found defective at the cervical wall. Nor do I hesitate to use it in a tooth whether dead or alive, adjoining one filled with gold. In doing so where gold touches amalgam in proximate teeth, the teeth must be pressed apart for some distance and then the filling made contour, so that when they come together again no ordinary attrition will cause them to separate. If they touch loosely, then galvanic shock must occur. While the poles of a battery are in contact, no sensation nor shock can be felt from the most intense current; but if disconnected and again touched, then comes the sensation. My object in this patchwork is the salvation of the tooth,—utility rather than elegance. If I had a large cavity to fill in a molar or bicuspid tooth, with the decay extending beyond the gum, and I found it difficult to keep that portion of the cavity dry, I should fill that part with amalgam and the rest of the cavity with gold.

Dr. D. Neall. I was driven to do this thing on what might be termed a moral basis. Dentists are sometimes charged with pulling each other's work to pieces. This seemed to me unprofessional, and, in some cases, dishonest. Rather than pull my professional brother's work or my own to pieces in the attempt to remedy a small defect, I have, time and again, patched these fillings with amalgam, and they have returned to me in good condition. We have long outlived the nonsense of '38 and '40 with regard to the noxious qualities of amalgam, and we may, for strong reasons now well based upon experience, apply it fearlessly in all proper cases, knowing and holding it to be a most useful and reliable agent.

Dr. Essig. May I ask Dr. Bonwill the condition of the surface of the amalgam when it is in contact in the same cavity with gold?

Dr. Bonwill. If exposed to attrition, it will not discolor; if not disturbed, it will discolor.

Dr. E. H. Neall. As something has been said of the "ideal filling," —one that shall combine all the advantages of gold and have none of its defects, I would like to ask the gentlemen if they have had any experience with Weston's Insoluble Cement. I have experimented considerably with it during the past four weeks, and find the results so far to be good. The material requires great care in mixing; rapid manipulation and absolute cleanliness being indispensable, as the cement should be in position in the cavity of the tooth while it is quite plastic. The best results can be obtained by placing two or three drops of the fluid upon a piece of ground glass, and then rubbing in the powder with a small spatula. One great advantage it has over oxychloride fillings is its freedom from escharotic action. The material can be placed in a badly-decayed tooth, where the nerve is nearly exposed, without the least inconvenience to the patient. My experience with it is too recent to testify as to its durability, but I have seen incisors that have been built up on their cutting edge, and stood the wear and tear of severe usage for six months, and show no perceptible change.

Dr. Dixon. I have been using the Weston Insoluble Cement for two months, and I am greatly pleased. I hope it will prove to be all that is claimed for it.

Dr. Guilford. A year or two ago I filled a very frail central on the mesial surface with oxychloride. There was at that time a gold filling in the other proximate surface. Lately one-third of the crown was broken off parallel with the cutting edge, and both fillings came out. I thought this would be a good case in which to test the Weston Insoluble Cement, especially as the incisor teeth were very long, very thin, and very much curved. After considerable difficulty, I succeeded in getting the tooth filled and built out to its original shape. I burnished it with an agate burnisher in about five minutes after its insertion. I told the lady not to spare it in eating, but to give it a thorough test. Thus far—a month or two—it has done very well. The only fault she finds with it is its unnatural bluish tint. If it stands this test it will prove itself the strongest cement filling we have ever had.

Dr. Tees. Like Dr. Dixon, I am inclined to believe many of these cases of galvanic action to be entirely mythical. I have never yet met with a well-defined one in my practice. In many instances the sensation can be traced to pressure of the filling upon the nerve, or to trouble arising from a devitalized pulp. A patient of the late Dr. George J. Barclay, of Pittsburg, an expert contour-filler, called upon me three or four years ago, and requested me to fill a very large cavity on the mesial surface of an inferior molar with amalgam, saying that Dr. Barclay would not use the material, and that he did not wish to submit to the prolonged and tedious operation of having a gold filling inserted. There was a large and beautiful contour filling on the distal surface of the adjoining molar. I filled the cavity with amalgam for him, and in a short time he returned, complaining of galvanic action between the two fillings. On his return to Pittsburg, Dr. Barclay removed the amalgam filling, and inserted a gold one in its place. On his return to Philadelphia, the gentleman called to see me again for other services, and on inquiring whether the removal of the amalgam filling, and the insertion of the gold one in its place, had relieved him of the sensation, he told me that it had not, that it still annoyed him.

Ambler Tees, D.D.S., A.M.,
Recording Secretary.

ODONTOGRAPHIC SOCIETY OF PENNSYLVANIA.

REPORTED BY JOS. R. C. WARD, D.D.S.

The regular monthly meeting of the society was held on Wednesday evening, September 3. Dr. Theo. F. Chupein, Vice-President, in the chair.

The subject of the evening's discussion, "Change of Structure and Density of the Teeth," was introduced by Dr. Faught, whose remarks were principally confined to the subject of food—manner of preparing, quantity and quality, etc.—and attributed the change in the density of the teeth to errors of feeding, claiming that food which abounds in lime-salts should be freely taken.

Dr. Chupein thought that occupation had even more to do with tooth degeneration than food; those whose occupation requires constant exercise in the open air, even hard labor, giving appetite for and proper digestion of the food, will show a marked difference in the structure and density of their teeth as compared with those whose occupations are more confining, though they may partake of the same food, at the same time, and prepared in the same manner. He cited cases of members of the same family whose teeth were very different in density, though all apparently enjoying good health.

Dr. Dorr thought that adults did not require as much lime-salts to be taken in their food as children; the former only needing sufficient for repair, while the latter required them for growth as well as repair. He attributed exostosis to the excess of lime-salts in the system, which not being needed for repair are deposited abnormally.

Adjourned.

LEBANON VALLEY DENTAL ASSOCIATION.

The semi-annual meeting of the Lebanon Valley Dental Association will be held at the Mansion House, Reading, Pa., on Tuesday, November 18, commencing at 10 o'clock. Session, one day.

Essays will be read by members of the association. Assigned subjects for discussion, "Riggs's Disease" and the "Rubber Dam."

All are welcome.

J. L. Ritter, *Corresponding Secretary.*

HARVARD DENTAL SCHOOL.

Dr. L. D. Shepard has been elected to the chair of operative dentistry in the Harvard Dental School vice Dr. George T. Moffatt, resigned.

BIBLIOGRAPHICAL.

THE ORIGIN AND FORMATION OF THE DENTAL FOLLICLE. By Drs. CH. LEGROS and E. MAGITOT. A translation from the French, with Introduction and Notes. By M. S. DEAN. Authorized and reviewed by Dr. MAGITOT, the surviving author. Including all the illustrations of the French work, with a number of additional illustrations, selected and original. Chicago: Jansen, McClurg & Co., 1879.

Since the publication in the DENTAL COSMOS, Vols. II., III., IV., of a translation from Drs. Magitot and Robin, on the "Genesis and Development of the Dental Follicle," the dental profession in America has had nothing offered it upon this subject which, in compactness and completeness, compares with the volume before us.

The translator has fully appreciated the "deficiency and inaccuracy of the literature in our own language on the origin and development of the 'tooth-germ,'" and in presenting this translation has bridged the gap which has so hindered the progress of the student in his efforts to obtain a knowledge of these obscure and complex embryonal structures.

Almost yearly important modifications of theories previously advanced have been made, so that until the appearance of this volume there was no publication upon which the student could rely for the desired information as to the development of tooth-germs.

While the present treatise necessarily traverses a portion of the ground gone over by previous writers, it is, nevertheless, a distinct memoir, rendered more comprehensible to the student by the conversational style in which much of the matter has been presented, which affords the translator opportunities of giving in a clear and familiar manner the views of different writers which are in correspondence with those of the authors of the original work.

It may be urged that the colloquial style is unsuited to the character of a truly scientific monograph, somewhat indeed compromising its claim to that title; yet the student taking his first lessons in the study of this, to him, veiled region of the animal economy will thank the translator for relieving his subject of tiresomeness, and for reducing it to a mental pabulum which can be the more readily appropriated.

The completeness and comprehensiveness of the volume as well as its scientific value are much increased by the study of the development of the dental system, not only of man, but of other mammifera. This feature gives the contents of its pages an importance to the student of comparative anatomy as well as to the special student of dentistry.

Its suggestions are also valuable to the medical practitioner who, by familiarizing himself with the nutritive supply and nervous connections of the developing tooth-germs, can much more intelligently appreciate the abnormalities in tooth-structure, and the disturbances of health which are so frequently the concomitants of the period of dentition in childhood.

Recognizing the "tooth-germ" as having a dermal origin, the translator most appropriately introduces his subject with some pages devoted to the consideration of the mucous membrane, simplified by a diagram showing the relative position of the different layers, and by a cut illustrating the microscopical appearance of the cells composing these strata. Meckel's cartilage and the development of the jaws are also fully described, and their understanding greatly facilitated by clear and appropriate illustrations in these introductory remarks. One paragraph from this brief sketch, explaining with its accompanying cuts the development of the intermaxillary processes, gives the student a more comprehensive idea of the origin of that not uncommon malformation known as "hare-lip," simple or double, than he could gather from reading pages of any ordinary work on surgery.

Following these introductory remarks in chapter first on "The Condition of the Jaws of the Embryo at the Period of the Genesis of the Follicle and the Epithelial Ridge," we have a good representation of the embryonal tissues. The notes given from Tomes and Frey explain the marked difference between the primitive dental groove of Goodsir and the infolding of the epithelial layer, as described by the authors, and recognized by other histologists of the present day.

The six succeeding chapters, making seven in all, divide the subject in such a manner as to permit of systematic treatment.

"The Genesis of the Enamel Organ," "The Formation of the Dental Bulb or Germ," "The Rupture of the Epithelial Cord," "The Origin of the Germs of the Permanent Teeth," "The Periods in which the several Component Parts Appear," are each in their turn treated so satisfactorily, and so amply illustrated with some forty-two plates or diagrams, that the reader cannot fail to be impressed with the fact that the authors as well as the translator well appreciated one of the most difficult embryological studies that we have to encounter.

The book is well indexed and printed in clear type on good paper. In closing we may be allowed to express the hope that the translator, whose clearness of vision, ample education, patient and persistent habit of thought, well qualify him for the task, will find time from his professional duties to give us the result of his own histological labors at some future day; although a translation from authors as well and favorably known as Drs. Legros and Magitot cannot fail to be highly appreciated. C. N. P.

The Mouth and the Teeth. By J. W. White, M.D., D.D.S. Philadelphia: Lindsay & Blakiston, 1879.

As it would be manifestly not in good taste for an editor to review his own productions, the publishers have seen proper to ask my perusal of the advance sheets of the above work, and an expression of my conclusions regarding it.

In response to this request I have read, with exceeding interest and satisfaction, a monograph which has impressed me as at once peculiarly concise and comprehensive.

Its title indicates large scope for a volume of such very moderate size, and yet in its twenty short chapters sufficient important and interesting information has been placed before the reader to fully meet the indication.

The anatomy of the mouth, together with its functions, the anatomical and functional relations of its surroundings, together with the salivary glands and their secretions, forms the appropriate introduction to the consideration of the teeth; and these, in turn, are so presented that from the anatomical, physiological, developmental, and eruptive stand-points a combined interest is awakened which renders the study of the chapters which treat of abnormal conditions and their hygiene pleasantly instructive.

The subjects of difficult dentition, its symptoms and its treatment; the care of the temporary teeth; the importance of the proper treatment of the sixth-year molars; the shedding of the temporary and the eruption of the permanent set, all receive, in my opinion, markedly wise consideration.

The systemic relations of the teeth are illustrated in chapters on their nutrition, the relation of food to their development, their nervous relations, and the causes of irregularities.

Tartar and its effects, dental caries and its treatment, and substitution (artificial dentures) are viewed from a judicious stand-point; and, while dogmatic teaching of any special kind of operation is avoided, excellent counsel is given throughout which cannot do other than stimulate the reader to seek a needed professional advice.

The advocates of separation, of contouring, of plastic fillings, and of gold only, will, it is thought, find equal cause to admire the reasonable remarks with reference to their conflicting opinions. In fact, it would seem that the volume could not offend any, but would be kindly received by all as by far the best presentation of the various topics for popular enlightenment which has yet appeared.

And, indeed, in this connection it might very properly be intimated that this "Primer" (as it is termed) is, by no means, equal only to "popular" instruction, but there are few, if any, dentists who would not find its perusal both interesting and valuable to them. It is *well worthy* a place in every dental library.

It is just such a book as all well-informed and capable dentists would find it to their advantage to recommend for the careful perusal of their patients, for, if this little volume be afforded the wide circulation which its merits entitle it to, it will assuredly exert an extended and happy influence in the saving of human teeth.

The cuts (twenty-four in number) are well adapted to popular instruction, and furnish the opportunity of clearly presenting to patients such matters as most frequently need explanation.

Two points seem worthy of incidental mention as meritorious, viz., the careful exclusion of technical terms, and the full explanation of the few that seemed unavoidable; and the utter forgetfulness on the part of the author of the *personal pronoun!*

If it is a thankless and objectionable task to adversely criticise the effort of any one who labors with his pen in the hope of doing good, it is no less pleasant when one meets with that to which he can give conscientious commendation; and of this number of the series of "Health Primers" I can truly say that I have never before read anything relating to dental subjects which contained so much condensed information, and which I regard as so *exceptionally correct* in teachings. J. F. F.

STUDENT'S POCKET MEDICAL LEXICON, giving the correct pronunciation and definition of all words and terms in general use in medicine and the collateral sciences, the pronunciations being plainly represented in the American phonetic alphabet. With an appendix containing a list of poisons and their antidotes, abbreviations used in prescriptions, and a metric scale of doses. By ELIAS LONGLEY. Philadelphia: Lindsay & Blakiston, 1879.

A compact, comprehensive, and convenient little dictionary—useful when a reference is desired either for definition or pronunciation of scientific terms.

OBITUARY.

HON. HENRY C. CAREY, LL.D.

DIED, at his residence in Philadelphia, October 13, 1879, Hon. HENRY C. CAREY, in the eighty-sixth year of his age.

MR. CAREY was one of the corporators and the first and only president of the Pennsylvania College of Dental Surgery.

DR. JOHN W. ADAMS.

Died at Bristol, Pa., August 8, 1879, of typhoid fever, Dr. John W. Adams, in the twenty-third year of his age.

Dr. Adams was a graduate of the Pennsylvania College of Dental Surgery, class of '77. He was an amiable and industrious young man, and an expert operator. His untimely death is the occasion of sincere regret and sorrow to all who knew him.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1880—PREMIUM OFFER.

The publisher calls attention to the announcement in our advertising pages of a small work on "The Mouth and The Teeth" as the Premium for subscriptions to the Twenty-second Volume of the Dental Cosmos, the first number of which will appear January 1, 1880. The book was written as one of the series of "American Health Primers," edited by W. W. Keen, M.D., published by Messrs. Lindsay & Blakiston, Philadelphia, and described as "a series of small volumes on subjects pertaining to sanitary science and the preservation of health, written by American authors of established reputation, selected with reference to their special knowledge of the subject from previous study or as private and public teachers."

The volume will be ready for delivery about November 15. It will be sent, postage paid, to all who remit the cash ($2.50) for the Twenty-second Volume of the Dental Cosmos before February 1, 1880.

SAMUEL S. WHITE.

PERISCOPE.

Regulations Relating to the Diploma in Dental Surgery in Great Britain.—The diploma in dental surgery is granted by duly authorized bodies under the following regulations:

Royal College of Surgeons of England.—Candidates must produce certificates: 1. Of being twenty-one years of age. 2. Of having been engaged during four years in the acquirement of professional knowledge. 3. Of having attended not less than one of each of the following courses of lectures: anatomy, physiology, surgery, medicine, chemistry, and materia medica. 4. Of having attended a second winter course of lectures on anatomy, or a course of not less than twenty lectures on the anatomy of the head and neck. 5. Of having performed dissections during not less than nine months. 6. Of having completed a course of chemical manipulation. 7. Of having attended, at a hospital or hospitals in the United Kingdom, surgery and clinical lectures on surgery during two winter sessions. 8. Of having attended two courses of lectures upon each of the following subjects: dental anatomy and physiology (human and comparative), dental surgery, dental mechanics, and one course on metallurgy. 9. Of having been engaged, during not less than three years, in acquiring a practical familiarity with the details of mechanical dentistry, under the instruction of a competent practitioner. 10. Of having attended at a dental hospital, or in the dental department of a general hospital, the practice of dental surgery during two years. The courses of instruction and hospital practice must be by lecturers or in institutions recognized by the college.

All candidates who commence their professional education on or after July 22, 1878, must, in addition to the certificates enumerated above, produce a certificate of having, prior to such commencement, passed the preliminary examination in general knowledge for the diploma of member of the college, or an equivalent examination.

Candidates who were in practice as dentists, or who had commenced their education as dentists, prior to September, 1859, and who are unable to produce the certificates required by the foregoing regulations, must furnish the board of examiners with a certificate of moral and professional character, signed by two members of the college, together with answers to certain inquiries.

The examination is partly written and partly oral. The written examination comprises general anatomy and physiology, and general pathology and surgery, with especial reference to dental practice. The oral practical examination comprises the several subjects included in the curriculum of professional education, and is conducted by the use of preparations, casts, drawings, etc. Members of the college, in the written examination, have to answer only those questions set by the section of the board consisting of persons skilled in dental surgery; and in the oral examination are examined only by that section. A rejected candidate is not admitted to re-examination within six months, unless the board otherwise determine. Examinations are held in January and June. The fee for the diploma is £10 10*s.* over and above any stamp duty.

Royal College of Surgeons of Edinburgh.—The examinations are written and oral. The examinations consist of two separate sittings, and are held subsequent to each period of the ordinary examinations, on such days as the college may appoint. Candidates must apply to the secretary of the college on or before the Saturday preceding the ordinary examinations, and must produce all the required certificates. Examinations for the dental diploma will be held as follows: first examinations, October 21, 1879; January 26, March 29, April 20, July 20, 1880; and the second immediately after the conclusion of the first examination.

Candidates must produce evidence of having attained the age of twenty-one years, and of having passed the preliminary examination in general education required for the ordinary license in surgery, or an equivalent examination. They must also produce certificates of having been engaged during four years in the acquirement of professional knowledge, and of having been during that period, or at some time previous to their examination, engaged for not less than three years in the acquirement of a practical knowledge of mechanical dentistry with a registered dental practitioner.

The following lectures and other courses of instruction must have been attended at a recognized medical school or schools: anatomy, one winter course; dissection and demonstrations, nine months; or dissection, nine months; and anatomy of head and neck, one course of twenty lectures; physiology, one course of not less than fifty lectures; chemistry, surgery, medicine, each one winter course; materia medica and practical chemistry and metallurgy, each one course of three months; clinical instruction in surgery at a recognized hospital, one course of six months, or two courses of three months; also the following special courses by recognized teachers: dental anatomy and physiology, dental surgery and pathology, dental mechanics, one course of each (not fewer than twelve lectures); two years' attendance at a dental hospital or the dental department of a general hospital.

Licentiates of the college, or registered medical practitioners, must produce certificates of attendance on the special subjects only, and are examined in these only.

Anatomy, chemistry (with metallurgy), and physiology will form the subjects of the first examination; surgery, medicine, materia medica, and dental anatomy and physiology, dental surgery and pathology, and dental mechanics those of the second.

The fee is £10 10*s*. Each candidate for the first examination must pay to the secretary of the college £4 4*s*. not later than 9 A.M. of the Saturday preceding the examinations; and if the candidate be unsuccessful, £2 2*s*. are returned to him. Each candidate for the second examination must pay £6 6*s*. not later than 9 A.M. of the Tuesday preceding the examination; and if he be unsuccessful, £3 3*s*. will be returned to him. No unsuccessful candidate will be remitted for less than three months.

Examinations sine curriculo.—Candidates who were in practice before the 1st day of August, 1878, or those not in practice, but who had commenced their apprenticeship as dentists before the 1st day of August, 1875, and who are unable to furnish the board of examiners with the certificates of lectures and hospital attendance required by the foregoing regulations, must produce: 1. A certificate of moral and professional character, signed by two registered medical practitioners, together with the full name, age, and address of the candidate. 2. The date of commencing practice or apprenticeship as a dentist, and whether, if in practice, such practice has been carried on in conjunction with any other business, and, if so, with what business. 3. Whether he has any degree or diploma in medicine or surgery, and, if so, from what college or university, or other body, and at what time it was obtained. 4. The particulars of professional education. The president's council shall determine whether the candidate is entitled to be admitted to examination; and such examination shall, with the exception of the preliminary examination and the exemptions in favor of registered medical practitioners, as before explained, be passed on the same subjects and in the same manner as is required for other candidates, and will confer the same privileges.

Faculty of Physicians and Surgeons of Glasgow.—The regulations as to certificates, curriculum, number of examinations, fees, and examinations *sine curriculo* are in effect similar to those of the Royal College of Surgeons of Edinburgh.

Metallurgy is added to dental mechanics as well as to chemistry.

Every candidate, before being admitted as a licentiate, must subscribe a declaration engaging not to advertise or pursue any other unprofessional mode of attracting practice.

The dates of examination for 1879–80 are October 21, April 20, and July 13; candidates must enter at least four days previously.

Royal College of Surgeons in Ireland.—The dental board of examiners consists of three fellows of the college, three registered dentists, and the president, vice-president, or other member of the council of the college (summoned in rotation).

Examinations shall be held at such times as the council shall direct. The examinations up to the 1st day of August, 1881, shall be practical, embracing the anatomy, physiology, surgery, and pathology of the teeth, jaws, and surrounding parts, and mechanical dentistry, and shall be partly written and partly oral.

All candidates shall lodge with the registrar of the college, at least one fortnight previous to each examination, the following certificates: 1. Of having attained the age of twenty-one years. 2. From two fellows or licentiates of any college of surgeons in the United Kingdom, and from two dentists of repute, testifying that the candidate is of good character, has been engaged in the practice of dentistry for at least five years, and has refrained from advertising or other unbecoming modes of attracting business for at least two years previously. 3. Of having lodged in the Bank of Ireland, to the credit of the college, the fee of £10 10*s*., half of which shall be returned to any candidate who fails to satisfy the examiners.

After August 1, 1881, every candidate must lodge with the registrar of the college, at least a fortnight previous to examination, the following certificates: 1. Of having attained the age of twenty-one years. 2. Of having been engaged during four years in the acquirement of professional knowledge. 3. From two fellows or licentiates of any college of surgeons in the United Kingdom, and from two dentists of repute, testifying that the candidate is of good character. 4. Of having passed the examination in preliminary education of one of the examining bodies recognized by the General Medical Council. 5. Of having lodged in the Bank of Ireland, to the credit of the college, the fee of £10 10*s*., half of which shall be returned to any candidate if rejected; and no candidate can present himself for re-examination for six months. 6. Of having attended, in a recognized school, one course each of lectures on anatomy and physiology, surgery, chemistry, practical chemistry and metallurgy, and materia medica, and two courses each of dissections with demonstrations, and of dental surgery, including dental mechanics. 7. Of having attended general hospital practice for two winter sessions, and the dental department of a general hospital, or a special dental hospital, for a further period of nine months. 8. Of having been engaged during at least three years in acquiring a practical knowledge of dentistry, under the instruction of a registered licentiate in dentistry.

The examinations are partly written and partly oral, preparations, microscopes, and other appliances being used.

Licentiates in surgery or fellows of any college in the United Kingdom, and graduates in surgery of any university recognized by this college, are examined only in subjects special to dentistry.

Every successful candidate, previous to receiving the license, shall declare that he will not advertise or pursue any other unbecoming mode of attracting business so long as he holds the license in dentistry of the college.

The following provision is made for instruction in dental surgery:

National Dental Hospital and College.—Consulting Physicians, Dr. B. W. Richardson and Dr. W. H. Broadbent; *Consulting Surgeons*, Mr. Erichsen, Mr. Spencer Wells, and Mr. Christopher Heath; *Consulting Dental Surgeon*, Mr. J. Merryweather; *Dental Surgeons*, Mr. Oakley Coles, Mr. G. J. Williams, Mr. A. F. Canton, Mr. H. T. K. Kempton, Mr. H. Rose; *Assistant Dental Surgeons*, Mr. F. H. Weiss, Mr. C. J. Noble, Mr. G. A. Williams, Mr. T. Gaddes; *Lecturers:* dental anatomy and physiology, Mr. T. Gaddes; dental surgery and pathology, Mr. Oakley Coles; dental mechanics, Mr. G. J. Williams; dental metallurgy, Mr. A. Tribe; operative dental surgery, Dr. W. F. Thompson; elements of histology, Mr. T. Gaddes; demonstrator of dental mechanics, Mr. H. Rose; deformities of the mouth, Mr. Oakley Coles; arts and literature, Rev. H. R. Belcher, M.A.

Clinical demonstrations are given from time to time.

Dresserships in the extraction-room are held for three months by six senior and six junior students of the hospital.

Prizes.—Four prizes in books or instruments are open for competition at the end of each course of lectures required. Certificates of honor are given in each class. The Rymer medal for general proficiency, value £5, with books or instruments, is awarded annually to the most meritorious student. Mr. Oakley Coles gives a prize for the best prepared notes of his lectures on dental surgery. Dr. Thompson will also give a prize.

Fees.—General fee for special lectures required by the curriculum of the Royal College of Surgeons of England, two courses each on dental anatomy and physiology, dental surgery and pathology, and dental mechanics, with one course on dental metallurgy, £12 12*s.* Single courses, dental anatomy and physiology, dental surgery and pathology, and dental mechanics, each one course, £2 12*s.* 6*d.;* two courses, £4 4*s.;* dental metallurgy, one course, £3 3*s.;* two courses, £5 5*s.* For lectures on subjects not required by the curriculum (these lectures, with the exception of the arts and literature class, are free to students who have entered for the special lectures), elements of histology and demonstrations on dental mechanics, each, £1 1*s.;* operative dental surgery, deformities of the mouth, each, £2 2*s.;* arts and literature class (three months), £3 3*s.* For the two years' hospital practice required, £12 12*s.* Total fee for the special lectures and hospital practice required, £25 4*s.*

Information respecting the hospital practice and the college may be obtained from the dean, Mr. Oakley Coles, at the hospital, Great Portland Street.

Dental Hospital of London Medical School.—Lectures are given at this school on mechanical dentistry, by Mr. J. S. Turner; on metallurgy in its application to dental purposes, by Mr. G. H. Makins; on dental surgery and pathology, by Mr. A. Coleman; on dental anatomy and physiology (human and comparative), by Mr. C. S. Tomes.

The staff of the Dental Hospital of London consists of *Consulting Physician*, Sir Thomas Watson, Bart., M.D.; *Consulting Surgeon*, Mr. Christopher Heath; *Consulting Dental Surgeons*, Mr. S. Cartwright, Mr. John Tomes; *Dental Surgeons*, Mr. Fox, Dr. Medwin, Mr. Gregson, Mr. Coleman, Mr. Moon, Mr. A. Hill; *Assistant Dental Surgeons*, Mr. A. Gibbings, Mr. D. Hepburn, Mr. R. Woodhouse, Mr. Bartlett, Mr. S. J. Hutchinson, Mr. V. Canton.

The Saunders scholarship of £20 *per annum*, and prizes, are open for competition.

Fee for two years' hospital practice or lectures, each, £15 15*s.*; fees for lectures and practice, £31 10*s.* Additional fees for a general hospital for the two years to fulfill the requirements of the curriculum vary from £40 to £50. Further particulars may be obtained on application to the dean, Mr. T. F. K. Underwood, at his residence, 11 Bedford Square, W. C., or at the hospital.

Instruction in dentistry is also given at the medical schools.—*British Medical Journal.*

CYSTS OF THE MOUTH (RANULA).—Mr. Francis Fox says that the oral mucous membrane is not infrequently the seat of cystic disease owing to the numerous small glands and follicles in this situation. Ranula, according to Mr. Fox, may depend upon (*a*) obstruction of the outflow from the minute follicles or conglobate glands; (*b*) it may be connected with the Whartonian or one of the larger ducts, or (*c*) it may be in no way connected with the mucous structure itself; (*d*) it may depend upon inflammation of the bursa which is placed between the genio-hyoglossi muscles. Similar cysts to these ranulæ occur in the mucous membrane of the lips and cheeks, and are often met with on mucous surfaces in other regions of the body. Their treatment is simple. If due to local inflammation, a small puncture will quickly effect a cure, or, if the orifice of the duct can be discovered, a small probe may be inserted; or, if arising from a salivary calculus, an incision into the duct will permit the easy removal of the concretion. If the enlargement be excessive, a seton of a few threads of silk may be passed through the tumor, so that the contents will gradually escape, and inflammation be set up. But sometimes troublesome secondary inflammation is set up, and perhaps it is better to puncture the tumor and then apply caustic to its internal surface. It may be necessary to remove a portion of the cyst-wall, in which case the more vascular portion of the tumor should be avoided. In ranula in the submucous tissue, which is larger, resembles sebaceous tumors, and contains a thick putty-like substance, the entire sac and its contents should be removed. Ranula arising from an inflamed bursa should be treated on the principle of destroying the secreting surface, and thus curing the disease.—*Medical Times and Gazette.*

TEETH GRAFTING.—Two interesting papers were presented to the Académie des Sciences at its meeting on January 6 (*Comptes-Rendus*, 1879, No. 1), by Dr. Magitot, and by one of his pupils, Dr. David.

Dr. Magitot, after adverting to his former communications relating to grafting of the dental follicles in certain species of the mammalia, states that in the present paper he carries the subject very much farther, embracing grafting the adult dental organs, and supplying practical applications.

"There are," he observes, "three varieties of dental grafting—1. By *restitution*, in which the tooth removed from its alveolus is restored to it, either immediately, or after a variable period of time. 2. In grafting by *transposition* a tooth is removed from one alveolus, and transplanted into another, whether in the same or in a different subject. 3. In *heterotopic* grafting, the teeth are grafted on various parts of the body other than the jaws, examples of which are recorded as resulting from the experiments of Hunter, A. Cooper, Philipeaux, etc." In the present paper Dr. Magitot confines himself to grafting by restitution, combined with the excision of the diseased parts before restitution is made. His researches on this point were first published in the *Gazette des Hôpitaux* for 1875; others have been published in the theses of his pupils, Drs. David and Pietkiewicz; and the operations of this kind have now reached the number of sixty-two. Of these sixty-two cases, fifty-seven have been definitively cured, a great number of these cures dating back from two to two and a half years. The age of the patient does not seem to have exerted any influence on the results, and the various kinds of teeth have been alike excised and grafted. The surgical indication for grafting combined with excision is essentially based upon the diagnosis of a special lesion characterized by *chronic periostitis* of the summit of the root of the tooth—*i.e.*, inflammation of the periosteum, denudation, and necrosis of the subjacent cement, and absorption of the ivory. It is a kind of mortification of the root. The morbid process which results consists in a series of accidents, as phlegmon of the gums and face, denudation and necrosis of the alveolar margin, and mucous or cutaneous fistulæ, etc. These accidents sometimes assume the chronic form and sometimes are intermittent. Left to themselves, they may give rise to great mischief, such as deformities and cicatrices of the face, and a general condition that may even place the patient's life in danger. As the mortified summit of the root of the tooth cannot be otherwise got at, preliminary extraction is required in order to enable the diseased portion to be excised, the portion of the tooth which remains sound being then restored to its original place. Before restoring it the surgeon may, if necessary, resort to various procedures, such as washing out the purulent cavity or removal of sequestra, while as regards the tooth itself, he may excise portions of its crown, or perform plugging in the case of caries. In a good number of the cases treated, the periostitis of the summit was not accompanied by concomitant caries, but in others a co-existing caries was able to be stopped while the tooth was out of the mouth. The subsequent treatment consists in the application, when necessary, of gutta-percha supports, drainage, and the removal of any mortified portions of the alveoli, etc. In general the consequences of the operation are very simple. When consolidation has been effected a slight local reaction takes place, accompanied by few or no general phenomena. The fistulæ close, the discharge ceases, and complete consolidation takes place in from a week to a fortnight. The tooth recovers its vascular connections and its uses are re-established. When the attempt fails, the tooth is simply eliminated by suppuration in a few days.

M. David in his paper thus speaks of "grafting by restitution:" "Re-implantation combined with extraction is a procedure which enables us to subject the teeth to operations which would have been impracticable in the mouth. We have personally resorted to it—1. For the adjustment of certain anomalies of direction. 2. In the treatment of caries when the situation of this did not admit of our reaching the pulp in order to destroy it, and practice *in situ* a satisfactory stopping. 3. In the treatment of the form of alveolo-dental periostitis, in which this affection is limited to the summit of the root. It allows of our excising the affected parts just as is done on a diseased bone; and this excision is the only means of radically curing the neighboring lesions which so often accompany this form of periostitis, as osteitis, necrosis, fistulæ, etc. If the tooth is carious it can also then be stopped. 4. It may also be resorted to in order to facilitate the execution of operations on another tooth or in another part of the mouth. The consolidation of the tooth replaced in its alveolus takes place, on the mean, from the tenth to the fourteenth day. It is more rapid (by the second or third day) when the roots are healthy. In cases of periostitis it is slower; and then principally when there are osseous lesions in the vicinity, the existence and maintenance for some days of a well-established dental fistula is of first-rate importance. By this means the suppuration obtains free external issue, and does not disturb the organic phenomena which are in progress between the root of the tooth and the alveolus. To the discharge of the pus by the alveolus is due our single failure. The various lesions of the vicinity (fistulæ, etc.) in general are cured soon after consolidation takes place. The cure has remained durable in our earliest cases for more than two years.

"Thus methodized, this procedure seems to us to carry the curability of dental affections to its farthest limits. It has given us but one failure in twenty-two cases."—*Medical Times and Gazette.*

HINTS AND QUERIES.

"He that questioneth much shall learn much."—Bacon.

Correspondents desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

Correspondents who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

Editor Dental Cosmos,—I have a patient, a prominent physician of this county, about forty years of age, for whom I find it very difficult to operate on account of a peculiar sensitiveness of the nerves that supply the palate—producing nausea on the slightest provocation. By working very carefully I have been able to adjust the rubber dam to the oral teeth without causing much disturbance; but for the superior molars he could not tolerate the dam or napkin at all, and it was with extreme difficulty that he could keep from vomiting while the rubber was adjusted to the inferior molars. He says he cannot hold a lead-pencil between his teeth without producing the same disturbance, and has been thus annoyed as long as he can remember. Scenes incident to his practice do not cause this disturbance. So far as will-power is available he tries his best to control himself, and will bear the pain incident to the work without flinching.

The only remedy tried was at the last sitting, when he drank some whisky previous to adjusting the rubber dam on the left inferior bicuspids and first molar; for one hour he felt no uneasiness, but for the remaining hour of the sitting his discomfort was as great as on previous occasions.

Will some one who may have had like experience please report the remedies or means employed to make the sittings more pleasant to both patient and operator?—Cyrus See, D.D.S.

Reply to L. M. and G. J. N., in September Dental Cosmos.—Drugs are capable of producing symptoms of abnormity when given persistently to healthy persons, even in very minute doses. It is in this manner that homœopathists "prove" drugs, keeping careful records of the symptoms appearing during such courses of administration, for use as the basis of prescription for the sick. Frequent repetition of "provings" establish the symptoms of a drug reliably. One of the symptoms produced by camphor, and thus recorded, is "singing, ringing, or buzzing in the ears."

Several years ago, a man for whom I made a denture on celluloid was unable to wear it, on account of *malaise* and general prostration, which was relieved by removing it from the mouth, but returned again with each attempt to wear it continuously. This depression is a commonly recognized symptom of camphor.

According to recorded "provings," nausea with loss of appetite is produced by sulphur, and great persistent thirst, water-brash, and flatulent eructations are among its other gastric symptoms. During last month, a lady consulted me, who had within eighteen months attempted to wear a partial upper denture of red vulcanite, but was compelled to abandon her efforts to use it, because of constant and increasing nausea, which nothing would relieve so long as she continued to wear it. Another dentist concluded that if black rubber were used she would have no such trouble, but soon after she had begun to use a plate made of the latter she felt the same distressing nausea; when she took out the plate the sickness would gradually subside, but it always returned within a day or two after beginning to wear it again. She had abandoned all effort to use it some time before her call on me. When she related the above history, I was led to think that the trouble she had experienced was the result of drug action (sulphur) on a peculiarly sensitive organization. I induced her to allow me to make a denture on gold, which she is now wearing without discomfort.

The sense of heat imparted to the mouth by both celluloid and vulcanite is, I think, mainly caused by their non-conducting qualities.

I have but little doubt that the "ringing in the ears" of L. M.'s patient was produced by the camphor of the celluloid, and that the sickness and loss of appetite of G. J. N.'s patient were the effect of the sulphur incorporated in her vulcanite set of teeth.—J. Morgan Howe, M.D.S., M.D.

Answer to G. J. N.'s inquiry in the September number of the Dental Cosmos. The remedy for G. J. N.'s patient is to wear a metal plate. Then her troubles will cease. Celluloid as well as rubber is a non-conductor, which explains the cause of the heat in the roof of her mouth. If the patient cannot afford gold or platinum, platinized silver will make an admirable plate. If tried I would like to know the result.—J. M. C., *St. Alban's*, *Vt.*

Reply to A. N. T.—I feel very much indebted to A. N. T. for his advice, in the last number of the Dental Cosmos, "to use gold that is not debased with copper." I have always used gold from one of the leading manufacturers of the country. If I had been in the habit of working cheap foil I could have readily understood the tarnishing of my fillings. I do not think much of his remedy, either. It would not suit most patients to be compelled to call periodically and have their fillings "burnished with pumice-stone."—J. W. West.

Answer to S. W. H., why gold fillings tarnish. I have had several such cases as the one spoken of, but always in a dead or dying tooth. As chlorine gas, sulphurous acid gas, or something containing some of their properties, would probably be the only agents found in the decayed matter of a tooth that would discolor a gold filling, I conclude that it must be one of these, and I am of the opinion that it is the latter. Chlorine gas could not be generated without the presence of something else than animal matter, but sulphur may be found even in the saliva, though in this case it cannot be from the saliva or the fillings contiguous would be likewise affected. Therefore, I think it must be sulphurous acid gas, thrown out through or around the filling from decayed matter within the tooth.—J. C. Brooks.

"Why do Gold Fillings Blacken or Tarnish?"—An idea strikes me, which I have not as yet seen advanced, and I would be pleased to call forth some criticisms on the subject.

Perhaps not a few in our profession have noticed the effect of carrying sulphur matches in the same pocket with a gold watch. It will surely blacken it. Is there not a chemical action between the *sulphur* and the *gold?* I have often noticed that my patients with large gold fillings on the labial surface of the front teeth cannot eat eggs with impunity, as the diet will surely blacken the fillings provided their surfaces have been *highly burnished.* Strange to say, the effect does not appear to be the same where the fillings are simply polished with pumice-stone and chalk. For this reason I scarcely ever place the burnisher upon a filling that will be exposed to view.—"Legett."

A Correspondent in "Hints and Queries" for last month inquires if the Dental Law of the State of New York will justify the registry of unqualified persons as dentists.

The act explicitly states who are qualified for registration,—viz , all dentists in actual and regular practice at the time of the passage of the law. For fear of arousing a fatal opposition, the authors of the law did not dare to throw restrictions around the registration, but caused the act clearly to state who might register as dentists.

Of course, it is absurd to suppose that any one who violates the act by unauthorized registration thereby becomes qualified for practice. He is really in a worse position before the law than if he had not inscribed his name upon the registry, because he has exhibited a desire to infract the law in advance.

Let the dentists in each county make a list of the names registered, strike off every unqualified one, and should such an one attempt to enter practice, report him at once to the officers of the State Dental Society, and his case will doubtless be attended to as soon as it can be reached.—B.

Answer to X., who propounds the following query:

"Will some philologist tell whether the following inscription on a sign is correct?

"John Smith, D.D.S.,
"Dentist."

Firstly, this isn't a question for a "philologist."

Secondly, the inscription is correct if John Smith *is* a D.D.S.; and he might have placed Dr. before his name and it would have still been correct, and also have added "Tooth Puller," "Tooth Carpenter," etc.

It is only a question of good taste as to how many times John Smith shall repeat his designation.—NORMAN W. KINGSLEY.

REPLY TO X.—The inscription "John Smith, D.D.S., Dentist," is not correct, being a vulgar and ignorant repetition; nor is Doctor Smith, Dentist, correct, any more than would be John Smith, M.D., Physician, or Doctor Smith, Physician. All of which leads one to think of dentistry as being merely a specialty of medicine, for certain it is a dentist is or should be a doctor, but graduating in one of the modern dental schools of the period does not make a doctor. Instead of dentists claiming the title "Doctor," graduates in medicine should have monopolized it long ago, and thus headed off the small army of commercial-college-like dental schools, so-called colleges, which have sprung up throughout the land. The proper way to nip this great American dental experiment in the bud, and protect the future of dentistry, is to do as did the far-sighted forefathers in medicine in this country many years ago, in several of the States—pass uniform laws, and enforce them. If dentistry had been protected in the past as medicine and surgery have been, it would have been the better for it. Then the inscription could have been made properly thus:

JOHN SMITH, M.D.
Specialty: Dentistry.

—J. W. K.

OBTUNDING SENSITIVE DENTINE.—Various remedies have been proposed and used for obtunding the sensitiveness of dentine. These have been more or less efficient according to their fitness, and in proportion as the constitutional and local conditions and the cause and extent of the disturbance were favorable, or the reverse. To the list of agents for this purpose, familiar to every dentist through the text-books and periodicals, another is suggested as worthy of trial, viz., glacial phosphoric acid, dissolved in two parts of water by weight and subsequently evaporated *rapidly* by heat to the consistency of glycerin. The reason for directing its *rapid* evaporation is that if the operation is conducted slowly the solution will crystallize on cooling,—a result which does not occur when treated as suggested. The sensitive spot, after thorough drying, should be touched with this solution. It has proved more efficient in a larger number of cases than any other material which I have tried. It is especially satisfactory when applied to the necks of the teeth, where there is exposure of the cementum and dentine, and the exalted sensitiveness which frequently accompanies such exposure. In cases of severe pain from the wounding of an exposed pulp, or following the application of the arsenical paste, let any foreign substance be removed, the cavity dried, and then, upon a small pledget of cotton on the point of an instrument, carry a drop of the liquid to the injured part. Relief will in many cases be almost instantaneous. Such has been the experience of the writer. —C. N. PEIRCE.

MY attention has been called to the fact that a young man, representing himself as my son, solicited aid of my friends in Philadelphia (and perhaps in other cities), in July last. I have thought it due my friends and acquaintances to say that all my sons were at home with me during the entire summer, and the said party was therefore an impostor.—C. F. RICH, *Saratoga Springs*, September, 1879.

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ORIGINAL COMMUNICATIONS.

ON PERICEMENTUM AND PERICEMENTITIS.

BY C. F. W. BÖDECKER, D.D.S., M.D.S., NEW YORK, N. Y.

(Continued from page 598.)

B. *Pericementitis. Plastic inflammation, and new formation. Suppuration.*—According to the severity of the irritation, and the constitutional peculiarities of the individual, pericementitis presents itself as acute or chronic. The clinical features of acute pericementitis are as follow: First, the patient experiences a sense of uneasiness in the root or roots of the affected tooth, which may continue for a few hours, or sometimes for a few days. The tooth then begins to be tender, the tenderness being increased by percussion with an instrument, pressure with the finger, mastication, application of warmth, active bodily exercise, alcoholic drinks, or the recumbent position. The tooth now becomes loosened, more painful, and is raised in its socket, compelling a discontinuance of mastication on the affected side of the mouth. With still increasing pain fever sets in, the patient's temperature is elevated, the pulse is accelerated, the appetite is lost, and the tongue becomes thickly coated. At this time the gum begins to show the effects of the inflammatory process; it swells, becomes more red, and very painful to the touch, especially in the vicinity of the apex of the inflamed root. This condition may last from two to four days. During this period the patient has no rest, and cannot bear anything to come in contact with the affected tooth—not even the tongue.

The pain at the height of the disease becomes excruciating and almost unbearable; a severe chill sets in, indicating that pus has formed. The corresponding cheek or lip becomes œdematous, and thus produces a marked disfigurement, and sometimes complete closure of the eyelids. The pain at this stage materially subsides, and assumes a more or less dull and intermittent character. When the swelling has reached its highest degree, a yellow spot shows itself, where the abscess will break, unless its opening be surgically assisted by the lancet. The opening of the abscess is followed by an almost instantaneous relief; the swelling of the face and of the gum gradually abates, the wound heals, and the tooth, after a certain period of time, becomes serviceable again. Unless the primary cause of the disease has been removed, however, the symptoms of inflammation will sooner or later reappear, and the abscess will be re-formed. The average duration of such an acute attack varies from five to ten days.

Chronic pericementitis—very often produced by calcareous depositions around the necks of the teeth—manifests itself, first, by a slight tenderness of the affected tooth, which is increased by mastication, or percussion with an instrument, or pressure. This tenderness after a few days may disappear, or may sometimes even escape notice. The tooth as a rule feels slightly raised, but without marked painfulness. The gum around the neck is a little swollen, bleeds easily, and is detached from the tooth. Pus in this variety of pericementitis mostly escapes between the gum and the neck of the tooth, though in some instances, especially in the lower jaw, perforation of the gum may occur. There is seldom any perceptible throbbing, nor do the gum and face swell so extensively and rapidly as in the acute form. A chronic inflammatory process, the symptoms of which are much less marked than those of an acute suppurative inflammation, is, as a rule, succeeded by a new formation of either fibrous or bony connective tissue, the so-called hyperplasia.

We know that inflammation of the pericementum may follow external mechanical or chemical irritation, and local or constitutional disturbances. Among the mechanical injuries may be enumerated a hard blow, undue pressure in regulating or wedging teeth, rough manipulation in filling, foreign bodies around the necks of teeth, etc. Chemical irritation is produced mainly by the inhalation of the vapors of phosphorus and by mercurial salivation. Local irritation may be brought about by calcular depositions, pulpitis, necrosis of the pulp, filling materials, or other foreign bodies passed through the apex of the root, broken necrotic roots, etc. Constitutional troubles leading to pericementitis are syphilis, rheumatism, scurvy. In most instances we have good reasons to assume that a local irritation of the pericementum has started the inflammatory process, although sometimes we may fail to detect the immediate cause.

Practitioners are aware that pericementitis presents itself in two forms, evidently according to the intensity of the inflammatory process. One form is the plastic, which, if repeatedly recurring, leads to a new formation of connective tissue, the so-called hyperplasia, or hypertrophy; the other and more severe form is the suppurative pericementitis, which inevitably leads to a more or less extensive destruction of the pericementum, to death of the pulp, and not infrequently to necrosis of the alveolar process. The present condition of microscopy allows of a thorough definition of the two varieties of the inflammatory process, though it is but a few years since we were first enabled to understand the minute pathology of inflammation in general. As long as humoral pathology formed the basis of microscopical observation, the blood and the blood-vessels were almost exclusively thought to be concerned in the process of inflammation. The exudation from the blood was regarded as the substratum for the inflammatory new formation as well as for the formation of pus. Hence the terms "plastic exudation," "organized exudation," "purulent exudation." This view was considerably modified by the researches of Rudolph Virchow, of Berlin, who considered the cells—and especially the connective-tissue cells—as the primary seat of inflammation, inasmuch as they only could proliferate,—produce new cells; the new formation of cells resulting either in hyperplasia of the connective tissue or in the appearance of pus. In Virchow's opinion the exudation merely represents nourishing material to the cells; which, after having taken up into their interior a certain amount of the fluid, become enabled to divide and proliferate. This author considered each cell an independent individual, and regarded them as the only active agents in the inflammatory disturbance.

Since 1867 new observations, mainly by I. Cohnheim, of Leipzig, have been made on the emigration of colorless blood-corpuscles. This observer, after having discovered the emigration of these bodies from capillaries and small veins, on irritated tissues, such as the exposed mesentery of the frog, claimed that the inflammatory process is due to such an emigration only. The so-called stable or fixed cells of the connective tissue do not, in this author's view, share in the inflammatory process, but the emigrated colorless blood-corpuscles so completely replace the former tissue that their accumulation is sufficient to produce a focus of suppuration. Pus is thought to be the main result of the inflammation,—the former colorless blood-corpuscles, after having passed the walls of the blood-vessels, representing pus-corpuscles.

The views which have been announced in the last thirty years have been widely divergent. S. Stricker, of Vienna, strongly opposed the assertions of Cohnheim, basing his opposition on microscopical observations. This investigator taught that the blood-vessels are necessary to the inflammatory process, which cannot be produced in tissues separated from the vascular system. Stricker, though not denying the emigration of colorless blood-corpuscles, asserted that we have no means to prove the fact of such an emigrating process in the inflamed tissue, but that we are fully enabled to trace the changes of the cells of the inflamed connective tissue from the earliest period of swelling up to the highest degree of proliferation, and the formation of pus-corpuscles therefrom. Stricker added to the doctrine of Virchow one important fact, viz., that not only the cells but all their offshoots may share in the inflammatory process through proliferation. Still, this author maintained that only the cells and their offshoots are active, while the intercellular or basis-substance is absorbed, or, so to say, killed by the cells, which in their luxuriant proliferation replace this interposing substance. According to this view every inflammation results in the formation of pus-corpuscles, which theory is contrary to clinical observation, which teaches that in a large number of inflammatory processes no pus is formed, but rather a new tissue.

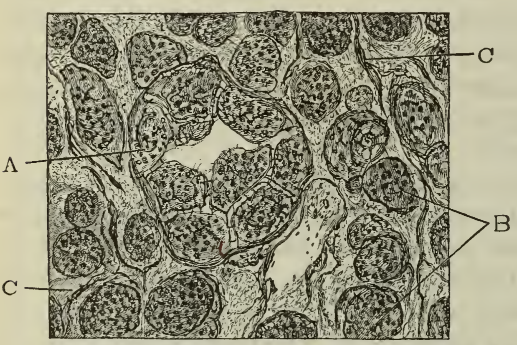
As a matter of course, the morbid process of a tissue cannot be fully understood except through a knowledge of the normal anatomy of the same. We comprehend inflammation, therefore, only since C. Heitzmann's discoveries of the normal structure of the connective tissue. This observer published his studies on inflamed periosteum, cartilage, and bone in 1873, and demonstrated that not alone the so-called cells and their coarser offshoots are engaged in the inflammatory process, but the sum total of the living matter present in the inflamed district of the tissue. As the living matter in the shape of a reticulum is present not only in the protoplasmic bodies (formerly so-called "cells") and their coarser offshoots, but also within and between the fibers of the connective tissue, it necessarily follows that the living matter will react upon the irritation, both in the protoplasmic bodies and in the basis-substance. The latter is merely liquefied,—that is to say, the relatively solid matter is made fluid, and from this moment the reticulum of living matter, formerly hidden in the basis-substance, is visible again, and thus the protoplasmic or embryonal condition of the tissue is re-established. Where formerly were visible scanty protoplasmic bodies and a relatively large amount of basis-substance, there are in an inflamed territory numerous protoplasmic bodies, and but little basis-substance is to be seen. The new formation of protoplasmic bodies may start from any particle of living matter, including also those formerly imbedded in the basis-substance. The original embryonal elements and their offspring represent what is termed the inflammatory infiltration. All these elements originally were uninterruptedly connected with each other by means of delicate threads of living matter, and thus represent what is termed a tissue. By the re-formation of a basis-substance a new amount of connective tissue may be formed, and in this way the inflammation results in hypertrophy or hyperplasia of the connective tissue. If, on the contrary, the inflammatory elements are torn apart, the inflamed tissue ceases to be a tissue; it is destroyed,—transformed into pus. The pus-corpuscles are the inflammatory elements, sprung from the involved tissue itself. In the former instance the result of the inflammation is a new formation of tissue; in the latter, a destruction,—that is to say, a transformation into an abscess.

Pericementitis, in its mildest degree, with lower powers of the microscope, is recognizable by the presence of nests, filled with medullary elements, in the midst of the connective-tissue bundles. The shape of these nests is, as a rule, oblong, corresponding to the longitudinal direction of the connective-tissue bundles, or roundish, in accordance with the cross section of bundles. The scantier these nests the milder is the inflammatory process. With high magnifying powers of the microscope we learn that the earliest stage of the inflammation consists in a transformation of the connective-tissue fibers into protoplasm. With the knowledge of the normal structure of the pericementum we are enabled to comprehend that a mere liquefaction of the basis-substance is sufficient for the reproduction of the protoplasmic condition of the basis-substance. Such a reproduction occurs in the shape of streaks in the midst of a bundle, independently of the original protoplasmic bodies,—the formerly so-called connective-tissue cells.

According to the spindle shape of the elementary fields of the basis-substance, spindle-shaped protoplasmic bodies have appeared, wholly identical with the normal protoplasmic bodies within the fibrous connective tissue. All these bodies are separated from each other by light rims, and connected with each other by the delicate threads of living matter traversing those rims. The finely-granular newly-appeared protoplasmic bodies soon afterwards become coarsely granular, which means that the living matter therein has increased in size. A liquid exudation as such is never visible under the microscope, but we infer its presence both from the liquefaction of the basis substance and the increase of living matter, which latter can only be due to an increased afflux of nourishing material. These changes take place in the newly-appeared as well as in the original protoplasmic bodies, the nuclei of which invariably become shining, homogeneous, and enlarged, owing to the same cause which led to the enlargement of the points of intersection of the reticulum of living matter.

We see next that a number of granules—the points of intersection of the reticulum—have increased in size to such an extent that they resemble small nuclei, and from these foci new protoplasmic elements are formed, partly shining and homogeneous, partly reticular in structure. After the originally solid lumps of living matter have split into a reticulum, many of the newly-formed elements contain solid nuclei. All elements are uninterruptedly connected with each other by delicate threads of living matter. Thus, the inflammatory infiltration is established at first in the shape of scattered nests, the centers of which correspond to the capillary blood-vessels. In later stages almost the whole amount of the connective tissue is transformed into medullary elements to such a degree that only scanty bundles of the original connective tissue are left. The swelling of the pericementum accounts for the painfulness of the process; while the loss of the firm basis-substance and its replacement by medullary elements explain the looseness of the tooth. These features will also account for the peculiar sensation experienced by the patient that the tooth is raised out of its socket.

Fig. 3.



Inflamed Pericementum in an early stage. A, capillary blood-vessel, the endothelia of which are coarsely granular and proliferating. B, medullary or inflammatory elements, imbedded in a finely-granular basis-substance. C C, spindle-shaped elements. Magnified 1000 diameters.

The changes of the wall of the capillary blood-vessels are of considerable interest. Doubtless the largest accumulation of the inflammatory elements takes place in the immediate neighborhood of the blood-vessels, for in the midst of many nests capillaries can be traced. We readily understand that in the immediate vicinity of the source of nutrition the inflammatory process must be the liveliest. This fact has been taken up as an argument by those who assert that the inflammatory nests are altogether due to an emigration of colorless blood-corpuscles. I am strongly opposed to this opinion, because my observations show that the majority of the inflammatory elements are originally connected with each other by delicate threads; therefore representing a tissue. The endothelia of the capillaries share in the inflammation, by being transformed into coarsely granular irregular protoplasmic bodies, which, by division, also produce new medullary elements, partly nucleated, partly devoid of nuclei. By the new formation of inflammatory elements from the endothelia the caliber of the capillary is first considerably narrowed and afterwards completely lost. An exuberant growth of the endothelia will, as a rule, result in the destruction of the capillaries in suppuration, and will probably give rise to formations which I shall presently describe.

In most of my specimens of inflamed pericementum I have met with a singular formation. A number of medullary elements coalesce into globular masses, greatly varying in size, and in some instances surrounding a central polyhedral space, evidently made by the compression of the former blood-vessel. The globular masses are either composed of medullary elements, shining, homogeneous, and split into smaller lumps of living matter, or they are continuous masses of a coarsely-granular protoplasm in which varying numbers of nuclei are seen. There is scarcely any doubt that the latter formations have arisen from the former ones through confluence of the single medullary elements. On the boundary very often concentric layers of round or spindle-shaped, finely-granular elements are present. In specimens stained with a solution of chloride of gold the concentric layers are of a pale violet, while the protoplasmic masses inclosed therein exhibit a dark purple color. Formations of this kind are well known in inflamed periosteum and medullæ of bone; they have been termed myeloplaxes, myeloid bodies, giant cells, etc. All hypotheses about their significance disagree with what I have seen and shall describe further on, viz., the formation of territories of bone-tissue from these clusters.

My specimens plainly show that in the so-called plastic inflammation of the pericementum all inflammatory elements remain connected with each other, and thus represent a medullary, embryonal, or indifferent tissue. In slight degrees of inflammation the morbid process may yield to what has been termed "the resolution of inflammation." Nothing is required but the re-formation of the basis-substance, and the normal condition is re-established, sometimes so completely that no trace of the former inflammation is noticeable. More severe forms of plastic pericementitis, or repeated recurrences of the inflammatory process, will result in a new formation of the connective tissue, the so-called hyperplasia. Higher degrees of plastic pericementitis are invariably accompanied by inflammation of the gum, the cementum, and the bony alveolus.

Inflammation of the gum (ulitis, gingivitis) in its mildest form is marked clinically by the so-called œdema, the microscopical features of which I have not studied as yet. Higher degrees of ulitis manifest themselves in essentially the same manner as pericementitis, viz., first the formation of scattered, afterward confluent, nests of inflammatory elements. The origin of these nests from the connective-tissue bundles of the gum is exactly the same as in the pericementum.

Cementitis is shown under the microscope by the presence of bay-like excavations on the periphery of the cementum, and sometimes also beneath the surface. These excavations are filled with medullary elements or multinuclear protoplasmic bodies. On an average the excavations are deeper and more numerous in proportion to the intensity of the original inflammatory process. To their presence is due the peculiar corroded appearance of the cementum on teeth extracted during an attack of pericementitis. As to the microscopic features of cementitis I have nothing to say. This process has been accurately studied and described by Dr. Frank Abbott (Dental Cosmos of 1878), with whom I fully concur, and whose assertions I have to corroborate.

Osteitis on the bone of the alveolus is manifested by a dissolution of the basis-substance of the bony tissue, either in the shape of bay-like excavations, corresponding to the territories of the bone-tissue, or in irregular fields filled with medullary elements penetrating from the surface into the depth of the bone. This process is invariably combined with osteomyelitis, and the result of both processes is the transformation of the hard, bony tissue into a soft medullary or inflammatory tissue. In some of my specimens of osteitis this change is exhibited to a very high degree, so that only small islands of bony tissue are left as remnants of the former wall of the alveolus. The details of this process I will omit, as they have been studied experimentally and microscopically by C. Heitzmann.

(To be concluded.)

PRESENT STATUS OF PRESERVATIVE DENTAL OPERATIONS.

BY W. H. ROBINSON, D.D.S., SUISUN, CALIFORNIA.

The past year has been prolific in the discussion of fillings and filling material. We thank the "New Departure," not for its advocated theory, but for giving the profession an impetus that has led to a careful inspection of our work, and an honest confession of our failures. We have scrutinized our operations, our modes, and the materials used, but the diverse and contradictory views expressed show that we are yet groping our way in the dark. It is hard to free our minds from prejudice, hard to see the plain facts before us, when these facts tell a story we do not wish to believe,—a story different from what we are wont to tell. The dental profession needs careful observers; thorough, accurate, unbiased observers,—observers who can look at golden contours with their beautiful lines and artistic merits, and at amalgam with its deformities; at the hand-pressure mallet and "New Departure" fillings; and, uninfluenced by theories, untrammeled by prejudice, see them in their naked truthfulness, grasp the facts, and learn the lessons they teach. We may be dishonest about them. We may and do make wrong statements about them, that befog ourselves and delude others. We are influenced by our position, patrons, and pockets; by our pet theories and our cherished habits. We were taught, have believed, and always said a certain mode or material was best. But the fact is, we know nothing absolutely certain about it. Should all the dentists in the world say that amalgam was a bad filling or gold a good one, gold and amalgam would not be changed a particle. Certainly the profession need not complain of lack of opportunities for observation. Nearly twenty thousand dentists putting in from fifty thousand to one hundred thousand of all classes and kinds of fillings daily afford ample room for thorough observation of the merits and demerits of all classes and kinds of fillings. If we do not know what kind of filling saves teeth best, this ignorance is not for lack of facts and data to judge from, but because we do not accurately observe these facts or accurately analyze them.

Every dentist, as he looks at the results of his own work or the work of others and its results, draws some inference, makes some deduction; but our deductions are terribly mixed. Until within a few years the almost unanimous verdict of the profession was, "gold is the best filling material." Now a large class led by the advocates of the "New Departure" say, "gold is the worst filling material." A few years ago these same men said gold was the best material,—the only material fit to fill teeth with. Gold as a filling material has not changed. The results of gold filling are not contradictory. If a certain filling saved a tooth under certain conditions ten or twenty years ago, it will save that tooth equally well now. Dentists' theories change. Facts are immutable. A careful review of facts in relation to filling and filling material would probably show more unanimity among dentists as to the relative merits of modes and materials than might be inferred from our contradictory theories.

I. We all agree that the productions of the mallet with cohesive gold give us a class of fillings that far surpass all others in appearance, and afford the best opportunities for a display of manipulative ability. The very perfection to which we have brought this class of fillings tends to prejudice us in their favor.

II. We all agree that some of these fillings do save teeth effectually and permanently.

III. But, alas! we must also agree that some of these artistically and mechanically perfect fillings do not save teeth.

But we decidedly disagree as to the relative tooth-saving merits of this class of fillings compared with other fillings. Some say they are the best, others say the worst kind of fillings. We also disagree notably about the reasons pro and con.

We think the profession would also agree on one point in relation to all other kinds of fillings, that in some cases they save and in others fail to save teeth. One class of observers, as they look at the beneficial results of our preservative operations and see that they all do save teeth, call the results "success." Another class look at the same operations, and as they see how many teeth they fail to save, call the results "failure." This contradiction is only apparent, for two honest and competent observers may look at the same operation and one call it a success and the other a failure. As we give this point careful thought we see it is quite difficult to find terms and definitions that will so classify operations as to draw a correct dividing line between successes and failures.

Should we say that all operations which save teeth five years are successes and those that do not are failures, we draw a line, but it is an absurd one. There is a class of carious teeth that very imperfect restorative operations will save for more than five years, and unfortunately there is another class that the most perfect operations will fail to save for half that time. An operation that restores an organ or part to the same degree of health or usefulness that it had previous to its diseased condition is in surgery acknowledged a success. Should the rules that define success in dental operations be more stringent?

In the present advanced state of operative dentistry, what should we expect filling operations to accomplish? The point is not what we may desire the theoretically perfect filling to accomplish, but what may the honest dentist promise his patrons? What should we educate the public to expect from average operations? To what extent does the work of honest competent dentists save teeth? I fear there is a general tendency to estimate the saving virtues of our filling operation too highly. We fill a tooth carefully, thoroughly, perfectly; we hope it will last a long time,—that it will last a lifetime; but stubborn facts tell us that many operations of this kind do not save teeth two years. These failures do not result from any mechanical imperfection in the filling; the cavity was properly prepared, the filling properly inserted and finished; the whole operation was mechanically perfect; the filling itself would last a century; but the tooth-substance around it disintegrated, and the perfect filling was, as a tooth-saving operation, a failure in one short year. We may well ask, Why?

Every tooth has a certain status of health,—an average condition called its normal or natural condition. We do not object to these terms when they are used to express, not perfect or absolute health, but the usual health status of the tooth before attacked by decay. This health status is extremely various. In some teeth it is so high as to be an absolute protection against decay, resisting the influence of the usual agencies that produce it; in others the health status is so low that they are peculiarly susceptible to destructive agencies. If we divide all teeth into ten grades, and call those with the highest health status one, and those with the lowest ten, grade one would by virtue of its own inherent qualities continue healthy during life; grade two would need but little dentistry, and very inferior operations would save teeth of this class for a lifetime; grade three would need more care, and so on down, till we reach in grade ten a class of teeth in which the natural health status is so low that the most perfect and persistent efforts of the most competent dentist cannot save them from early disintegration. If grade nine were saved it would require an intelligent selection of material, judicious manipulation, and vigilant attention. Grade eight would be easier saved, and between the extremes in these grades we have that great host of teeth that are saved by intelligent care or lost for lack of it. A little thought here shows us that the most important factor to be considered in making a prognosis regarding dental operations is the health status of the tooth. Filling cannot change this health status, but can add greatly to the chances of its preservation. Take a representative tooth; its health status five. What will the most careful filling do for that tooth? We cannot say whether or not it will save it, but we know it can be restored to as good a degree of health as it was in before it was attacked by decay; and an operation that does this, if not an absolute success, is at least a very creditable failure. But admitting that the operations of competent dentists restore such teeth to the same or even to a better condition than before they were affected by decay, that will save them but a few years at most. Decay will again necessitate refilling, and so on till the tooth is lost.

The question is asked, What proportion of decayed teeth can be saved by filling? Perhaps a better way to ask the question would be, How long do fillings last? In the effort to answer this question correctly, I have noted the views expressed in our current literature, and also corresponded with some whose views are respected by the profession.

In answer to my queries, Dr. W. A. Pease, of Dayton, Ohio, writes me under date of April 14, after consultation with a couple of dentists in whose judgment he has much confidence,—both of them careful fillers and not boastful men,—"Taking all teeth filled by really good operators, in three years fifty per cent. will fail; in five years seventy per cent. will fail; after ten years only ten per cent. will remain. In bicuspids the loss will be greater. And in the average bicuspids filled on approximal face (before patient is eighteen years old) the loss will be still greater, and scarcely three per cent. will remain after ten years. This refers to mallet filling with annealed gold. Soft gold and hand-pressure saves a much greater percentage." This is not a very flattering statement. Most of us do not believe it. I think he places the loss rate too high. But, modify it as we will, we must admit that it contains an amount of truth that is very unsatisfactory. Society in the East is more stable than here, and dentists have had better opportunities to gather statistics in regard to filling operations, and so far as we have been able to learn their figures they place the per centum of teeth that filling saves much lower than dentists here estimate it. Where the teeth are close together, and the bicuspids are filled on one or both of their proximate surfaces before the subject is twenty years old, the profession must greatly improve its treatment or candidly admit it cannot save them.

The facts are that the very best fillings save a large class of teeth only a few years, and that there is another, and quite a large class too, that cannot be saved at all unless we call refilling every year or two, for eight or ten consecutive years and then extracting the roots, saving them! These facts have so forced themselves on the profession that its members have been compelled to explain and in some way account for these unsatisfactory results. The "New Departure" says, gold is the trouble; use almost any other filling material and you will save these teeth. Unfortunately, many of these teeth that have gone to destruction, or are now on the way, have not been filled with gold, but with just the material the "New Departure" says will save them. To discontinue the use of gold, and substitute other filling material, is an injunction easily complied with. Demonstrate that thus teeth can be treated more satisfactorily than with gold, and all honest dentists will obey. Amalgam, tin, "Hill's stopping," and os-artificiel are not new to the profession. They have been on trial from twenty to forty years. We want to emphasize the fact that during the last forty years fillings of other materials far outnumber those made of gold. The profession has had abundant opportunities to test and to observe the durability of various filling materials, and their preserving effects on teeth, though observing and learning rather slowly, it would seem. But if after an extensive use of two materials for twenty-five years we do not know which saves teeth the better, we are either poor observers or there is little difference in the relative merits of the materials. The profession as a rule has been in favor of gold and often bitterly opposed to amalgam. Yet amalgam has been extensively used, and it has had a fair trial and ample criticism.

Now for an honest look at results:

I. There is a class of teeth that amalgam is better adapted to save than gold or any other filling known to the profession.

II. There is a class of teeth that amalgam fillings do not save, and for which it seems to be the very worst filling known to the profession.

Last August we filled some teeth for Mr. P., a healthy man, aged forty-eight years. He had nine soft-foil, hand-pressure approximal gold fillings in his upper front teeth. These teeth and the fillings (which had been inserted in 1851) were in the most perfect state of preservation. Some of them were quite large fillings, but after twenty-eight years' wear and with but little care were as good as when inserted. Hand-pressure gold fillings are good to save that class of teeth. At the same time the same dentist had also put in about the same number of amalgam fillings, correct data in regard to which were not so easily ascertained, but many of the teeth filled had been lost. About three years previous to his visit to us all the amalgam fillings had been renewed. The contrast between the preservative effects of gold and amalgam in these teeth was plainly visible. There was decay deep and extensive, considering the good quality of his teeth, around every amalgam filling. Here is a fact: gold did save his teeth perfectly twenty-eight years; amalgam, with a decided advantage as to locality, did not save them four years. We could multiply cases. They are right before our eyes, in the same mouths, in the nearest possible similar conditions. Amalgam does not and cannot be made to save all teeth, and many of those that some call saved by it are blackened and disfigured. I know isolated cases prove nothing, but the case mentioned is not an isolated case; it represents a considerable class of teeth that amalgam does not save, and that gold does so beautifully and permanently save that we need nothing better. A case that represents the other extreme is Mr. H., a healthy young man, aged twenty-one. We had the pleasure of examining his teeth on our first arrival on this coast. We never saw a better lot of fillings, and yet in less than three years after, out of eight or ten large crucial operations on his molars two or three only remained. Tooth-structure had wasted around these fillings like snow in the summer sun. And around a dozen or so of smaller gold fillings, with only a few exceptions, the tooth-substance was disintegrating. But three or four bicuspids (shells) that had been condemned as not worth filling with gold, and had been filled with amalgam, were all right, and plain black monuments that said, "In proportion as this class of teeth need saving, gold is the worst and amalgam the best material to save them." This is not an exceptional case, but representative of a class that the best gold operations will not save. To mention cases in which mallet operations have restored decayed teeth to usefulness and beauty would be superfluous. They are legion and among the brightest triumphs of dentistry.

In relation to the saving qualities of tin we know but little. Ever since we entered the profession observation has convinced us that tin as a filling is more talked about than used. It is too soft for crown cavities, and in many mouths oxidation destroys it in a year or two, but under favoring conditions it makes a good filling. Some of the cements make very useful fillings,—better than anything else in rare cases. As a rule, however, they dissolve in from three months to two years. Gutta-percha has its places; and it is good there. But those places are scarce.

We have tried to look at fillings and filling operations just as they are. Thousands of other dentists are doing the same thing. We are gleaning truth, collating facts, and already know a few things beyond dispute about the merits of preservative operations. Twenty years ago it was the fillings themselves that failed. Now the fatal defect is not always chargeable to the filling. Fillings that would last a lifetime do not save teeth a year. So far as these failures are due to low health status,—conditions inherent in the teeth,—how can we expect a foreign body that simply by mechanical occupation restores the parts lost to change these inherent conditions?

There is no doubt that the teeth sympathize with systemic conditions. We need a *new* departure right here. Our present modes and manipulative processes are so near perfection, and in the choice of filling materials we have such a wide range, that if it were within the scope of possibility to save some classes of teeth, some of our materials and processes would do it. But no kind of filling material, no matter how used, prevents disintegration of tooth-structure; some induce it,—the best only mechanically protect the tooth; none have any real prophylactic effect.

The assertion that galvanic action is the primal cause of disintegration about fillings has not been proved:

I. Around thousands of gold fillings that have been in teeth from ten to twenty years no lesions occur; while in these same teeth in parts remote from or but slightly exposed to galvanic action, lesions do occur.

II. Around teeth filled with materials electro-positive or neutral to dentos lesions charged to galvanic action do occur.

III. There is no doubt that in some cases the lesions around fillings are the result of galvanic action. But usually it is only one of many and secondary causes engaged in the process we call decay.

A few years ago Mr. Fletcher, of England, surprised the dental world by giving the results of his experiments in testing the leakage or non-leakage of fillings. There were some stern truths in his positions. Many fillings beautiful in contour and finish did leak. He claims that he has demonstrated "that more than half of all adhesive gold fillings leak. And that the few that do not leak never could by any possible combination of circumstances fail;" and, "that all fillings that fail in two or three years are grossly defective." Even the "New Departure" advocates are divided as to what extent perfectly moisture-tight gold fillings excite galvanic action. Some of them contend that a filling perfectly moisture-tight cannot endure galvanic action, and that it is always induced by leakage. All agree that galvanic action is *usually* induced by leakage, and where a weak current exists without it, leakage would greatly strengthen it. These are the facts as stated: one-half of all fillings fail, the direct cause being marginal lesions induced by galvanic action. The *general* cause of this galvanic action is leakage, and the *exceptional* cause the metal in the filling. The conclusion is that the great cause of failure is imperfect manipulation. The all-important point, therefore, in fillings is *perfect moisture-tight adaptation between the filling and the tooth-substance.* Soft gold foil gives the most perfect union between filling and wall, and the weak point in solid cohesive fillings is that they do not secure such perfect union.

Apart from all theories, we must accept the stubborn fact that some teeth cannot be saved by filling. No mode now practiced or material in use does or ever will save such teeth.

Coming down to actual figures, how long do the fillings of competent dentists preserve teeth? As approximate answer to this question we tabulate the data that have come within our reach:

PERCENTAGE OF TEETH WHICH FILLING HAS SAVED.

	Five Years or longer.	Ten Years or longer.
Molars, medium crown cavities; no other decay	90	80
Molars, complicated with lateral decay, but pulp intact and walls strong	65	35
Molars, devitalized, with frail walls	24	10
Bicuspids, with lateral decay	40	8
Bicuspids, devitalized and frail	20	5

According to this estimate the average duration of fillings would be about six years; according to Dr. Pease, about four and a half years. At first thought it seems to most of us that fillings last longer than five or six years. And even after *second thought* some of us will maintain that they do. I base my estimate entirely on data of other dentists,—competent honorable members of the profession, with no motive to decry the work of their hands; on the contrary, like the rest of us, with strong temptations to favor their own work and be slow to see its faults.

As I note these figures I ask if it is possible that the work of good operators only lasts six years, and that one-half of all fillings fail within five years? I have tried to tabulate the causes of these failures, taking one hundred teeth which fail within five years from lesions in the crown and leaving out pulpitis, periodontitis, etc.:

Number in which the health status is so low that the most perfect material and manipulation will not save five years	20
Incompatible filling materials	15
Imperfect operations	30
Crowding and improper positions	15
Lack of care by patient	10
New centers of decay near filling	10

A few years ago we extracted a last remaining tooth—an upper bicuspid—with soft gold filling in its distal wall very close to the gum. Both tooth and filling were in a perfect state of preservation. The filling had been inserted by Dr. Hullihen forty-two years before. That filling was so soft that a small strong excavator could be forced to the bottom of it. Most of us to-day would be ashamed to insert a filling as soft as that. None of us should be ashamed of a filling that would save a tooth more than an average lifetime. Soft foil and hand-pressure made a good filling for that tooth. And that same kind of filling will always be good for that kind of teeth,—a great deal better than our present practice of cutting from crown to cavity and restoring with mallet operations. Again, mallet operations restore and save bicuspids that soft foil and hand-pressure could do nothing for. If the best operations of our best dentists fail to save teeth, when is the operator to blame? We should say:

I. When he neglects anything in the minutiæ of preparation or in the operation that it is possible to utilize to give permanency to his work.

II. When he employs any mode or material not adapted to saving the class of teeth he is operating upon.

III. When, his materials and modes being the nearest possible approximation to perfection, his operations fail because the teeth are so crowded that merely filling them, no matter with what or how well, will not save them.

The last named are very common failures, and often the dentist is as much to blame for the result as though he had inserted a leaky filling or improperly prepared the cavity. Here is the rock on which so many good operations and good teeth go to wreck. Any one can take an actual case from his own practice that will illustrate and emphasize this point. A miss of say eighteen calls; she has average good teeth, regular and close together. You fill the crown cavities, and the teeth are saved from ten years to a lifetime. But in the crowded bicuspids there is proximate decay and indication of more. You think dentistry ought to save these teeth, and you tell the patient it will. You are anxious to save those bicuspids, and you carefully and thoroughly fill them. There is not the slightest defect in your work. After the lapse of a year other of the bicuspids are decayed, and you fill as before. The next year you have to fill new cavities, and you carefully examine your first fillings. You find the tooth-structure soft around the fillings. Can it be possible that your fillings were imperfect? You make doubly sure that now they shall be without blemish. The next year more refilling is required, and so on. Soon, in refilling, you have to cap or devitalize. Then comes periodontitis, and the forceps is your next resort. You extract a bicuspid on each side, and devote your best energies to save those which remain. Files, burs, disks, and decay have reduced them much below their "fighting weight." So far in their battle for life they have been losers. You fill them temporarily: and by some simple device make them occupy part of the space gained by extraction. Room and the friction of the brush and mastication seem to give them a new lease of life; if not new vitality, it places them under conditions in which the vitality they possess protects them much better from destructive agencies. In a few months you restore them to shape and comeliness, and examining them occasionally, you become convinced that they are saved. What saved them? Not careful filling. This oft repeated utterly failed. It was *room* that saved them, or at least supplied the necessary conditions.

Right here we need another new departure,—a bold and determined one, that shall have for its basal principle to secure the proper position and relation of the teeth to each other. The every-day experience of our best operators demonstrates that it is nonsense to attempt to save teeth without a practical recognition of this principle. One bicuspid saved is better than two lost. The worst treatment some teeth can receive is fillings that save them only a few years,—long enough to seriously injure or totally destroy their approximates. I know I tread on disputed territory. But what is the ordinary treatment of frail bicuspids? It is to fill them when the patient is from sixteen to twenty years old, and soon after to refill; then fill again; then cap and fill; then devitalize and fill; then extract,—often all this in five years.

Our present practice on this class of teeth is a failure. We must greatly improve it. We should not attempt operations that are sure to end in failure. The performance of brilliant operations that result in the loss of the teeth in a few years is our present professional hobby, but it is not a pleasant one to ride. A practice that exacts some unpleasant necessary conditions to start with, but which results in operations that are permanent, is better for a long journey. Dentistry is more than contour operations though mechanically and artistically perfect. It is the science of saving teeth. We have not yet reached perfection, but are tending towards it, and all the faster because of these merciless searching critics who are never satisfied with the good we have so long as there is a possible better.

Creeds are in fashion now, and as we, like everybody else, like our own creed best, we give it,—refusing to bow to either the so-called "Accepted" or "New Departure" creeds,—and will call it, if you please, the "Pacific Creed":

I. There is a class of teeth in which the health status is so low that the most compatible materials and perfect operations cannot save them.

II. There is a class of teeth that hand-pressure, soft-foil fillings save that cannot be saved as well by any other known mode or material, and for which cohesive gold and amalgam are specially objectionable.

III. There is a class of teeth for which cohesive gold in solid contour restorations is the only suitable filling, as it restores and saves them better than any other known process.

IV. There is a class of teeth for which amalgam and tin are the best fillings, and which these save when gold would not.

V. Gutta-percha, oxychloride, etc., are good filling materials. They have an important place in dentistry. Every dentist should find that place and put them there; as a rule that place is under something more substantial.

VI. Failure of fillings results from various causes, prominent among which are, low health status of the teeth, aggravated by unfavorable conditions (crowding, pressure, irregularity, contact with foreign matters), incompatibility of filling materials, and defective operations.

VII. That galvanic action is the primal cause of marginal lesions around fillings in some cases is proved beyond question, but, as a rule, it is only one and a secondary cause of decay.

VIII. A filling that leaks or has any other mechanical defect is not and never can be the best-known filling for any tooth. No defective filling ever put in a tooth is as good as that same filling would be without that defect.

IX. A large class of teeth now lost after oft-repeated operations these same operations would save, if the teeth were first put in proper positions as to their approximates,—given room that would admit of perfect cleanliness. This means that when by extracting one tooth we can save one or both of its approximates this very unpopular procedure is better practice than nice operations that lose two or three teeth.

X. The only correct dental practice is that which intelligently seeks those modes, materials, and conditions which are best adapted to save the tooth in any given case. If all the profession acted on this principle many teeth that are now lost would be saved.

XI. Gold, amalgam, tin, gutta-percha, oxychloride, etc., *per se*, are all good fillings.

XII. The best dentist is he who makes an intelligent selection from all materials and methods,—a hobby of none.

XIII. The results being equally good, that preservative operation is best which causes least pain to the patient, requires least labor from the dentist, and least waste of healthy tooth-structure.

OPERATIVE DENTISTRY.

BY MARSHALL H. WEBB, D.D.S., LANCASTER, PA.

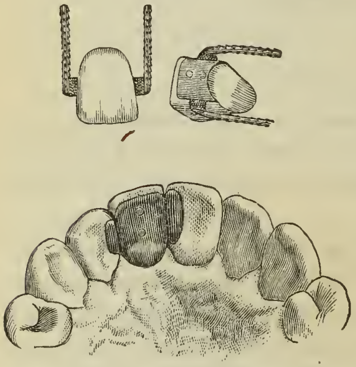
(Concluded from page 606.)

THE insertion of a crown without plate or clasps where no root remains is a difficult operation, but when well performed, and the crown attached to teeth that are firm in their sockets, it is both satisfactory and permanent.

The first such operation performed by the writer was completed February 12, 1873, and the crown now remains as firm as when inserted. The operation was performed in the following manner: after suitably forming the cavities in the proximate wall of each tooth next the space left by the loss of the one that had been extracted (unnecessarily) some years before, an impression of the parts was taken, and a plain porcelain crown was selected, fitted to place and backed with gold plate (18-k.). A portion of the backing extended about one and a half lines from each side of the crown for insertion in the cavities prepared in the adjoining teeth, and to these parts a gold wire was soldered to fit into the pulp-chamber of the central and lateral incisors. A small gold plate was then formed to fit upon the gum, covering as much space as was taken up by the neck of the natural tooth. When the backing was riveted to the pins in the porcelain and this placed in position, and while the whole rested on the small plate upon the gum, the backing and plate were so secured by wax that they could be removed intact, and, after being placed in a matrix, soldered. Each extended side of the backing and the surface of the wire was barbed with an engraver's lossing tool, so that the gold foil would the better secure the crown when filled into every part.

The porcelain, with the gold attachments, being ready for insertion, a piece of light medium rubber dam was put in place on two teeth each side of the space to be filled, and over the gum upon which the crown was to rest. (The rubber takes up but little space, and this is more than compensated for when the ligature—waxed floss-silk—is pressed to or near the neck of each adjoining tooth.) Oxychloride of zinc was then placed in the pulp-chamber of the central and lateral incisors and the crown at once pressed to place. When the cement had hardened sufficiently to safely admit of further progress in the work, a portion of it was cut away from around the wire so as to make proper anchorage for the gold. Small pieces of light cohesive gold foil were then impacted around part of the wire and that portion of the plate extending into the cavities, and the crown was thus secured. The porcelain and gold attachments as prepared for insertion and the crown in position are here illustrated.

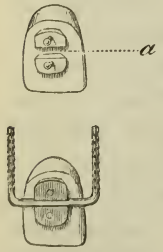
Fig. 7.



The cavity in the central incisor was extended to the cutting edge of the tooth, that access might be had to the wire and both sides of the plate; foil could not otherwise have been put in place, unless a portion of the labial margin of enamel were cut away, and this would have been objectionable because of the exposure of gold. A small part of the labial instead of the cutting edge of the enamel of the lateral was removed, for the reason that there is not such a body of tissue as to safely allow it to be cut away to the same extent as in a central incisor. The margin of enamel was so formed, and the foil so inserted and finished, however, that, though the gold can be seen, it is not conspicuous.

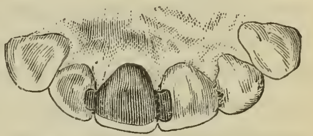
While the operation just described has thus far proved successful, yet there is a possibility of the porcelain being broken from the platinum pins which hold it to the gold plate. To avoid such an accident a groove should be cut in each side, and along the cutting edge of the porcelain (Fig. 6, *b*), that gold foil may be impacted into it, after a heavy backing of gold plate and the wire have been fixed in place and soldered. After the groove has been cut in the porcelain with a fine-edged corundum disk, one with an edge of the diameter of the gold wire selected for the case should be used to make a groove across the porcelain between the pins (Fig. 8, *a*), into which the wire to connect the artificial crown with the natural teeth is to be placed (Fig. 8), either beneath the plate or so that the edges of the latter may be joined to it, as the necessities of the case may require.

Fig. 8.



A starting-point should be made either between the gold backing and porcelain, or between this and the wire, and the latter firmly fixed in a hand-vise while the gold foil is being impacted with the electro-magnetic mallet. When the gold is properly and solidly placed in the groove and over the backing and wire, it not only aids in securing the porcelain, but the contour of the crown can be nicely filled out, and the operation made durable and beautiful (Fig. 9 and Fig. 1, *i*).

FIG. 9.



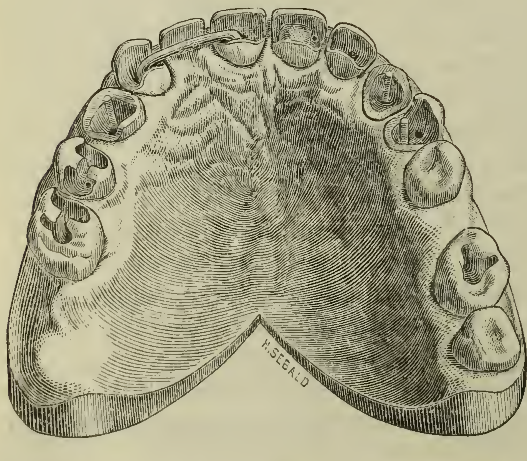
The surface of the gold placed along the base of the crown to the edge of the porcelain, and which is to rest against the gum, together with the palatal portion, ought to be properly formed and finished before the crown is put in place, and this should be done in the manner before described. There should be a little space between the wire and cervical wall in each tooth to which the crown is to be attached, and narrow pieces of light gold foil carefully placed in this part, between the wire and enamel, with small curved instruments and with the aid of the mallet; the surface of the gold at this part at least should be smoothly finished with very narrow ($\frac{1}{16}$ in.) strips of fine emery-cloth before the rubber dam is removed.

In cases where the pulp is living in one or both of the teeth to which an artificial crown is to be attached, the heavy gold plate or the wire must be so arranged as to fit as accurately and to be made as secure as possible in the cavities prepared for them. In some cases, and where the form of the cavity admits of it, it is better to adjust and solder a small gold plate to the end of and at right angles with the wire attached to the crown. This plate should be so formed and beveled that gold foil can be solidly placed over the surface of it next to the artificial crown, and into the groove made around the cavity in the dentine along the boundary-line between this tissue and the enamel. When all is in readiness for the operation, oxychloride of zinc should be placed in each cavity and the crown immediately put in place, and very carefully held there till the cement has so crystallized as to secure the ends of the wire and plate; about an hour is necessary to such perfect crystallization as to safely admit of the preparation for and the packing of the gold foil. The oxychloride of zinc should be left between the little plate or end of the wire and bottom of the cavity, and all parts where gold cannot well be placed; this preparation also protects the dentinal fibers from thermal changes.

One of the most satisfactory operations the writer ever performed was the insertion of a crown where a cuspid root had been extracted (unnecessarily), and the lady subjected to the wearing of a gold plate for some time. This crown was prepared and the contour filled out with foil as described (and as illustrated, Fig. 9), but gold wire, No. 13, was attached to and built in with the porcelain, and placed into the pulp-chamber of the adjoining lateral incisor (which had been filled), and this same wire extended from the anterior to near the posterior proximate surface of the first bicuspid tooth, the pulp of which remained in normal condition. The crown was placed in position with oxychloride of zinc, and cohesive gold foil was then impacted with the electro-magnetic mallet around a portion of the wire in the root and into the cavity in the crown of the incisor, and also into the cavity in each proximate wall of the bicuspid tooth, as well as around and over the wire, joining the two fillings through the enlarged fissure.

The most extensive operation of attaching a crown to adjoining teeth was performed by the writer before the Pennsylvania State Dental Society, at Delaware Water Gap, in July, 1879. In this case disintegration had taken place in many of the teeth, and cavities of decay had been prepared and filled from time to time. The teeth were abraded and the dentine was exposed along the entire cutting edge of each tooth that occluded with another. The right upper lateral incisor had been lost twelve years before. The crown of the left cuspid tooth was missing, and but a small portion of the enamel and dentine of the first bicuspid upon either side remained. These last were, of course, pulpless, as also were the right cuspid and central and left lateral incisor teeth, and the pulp-chamber of each of these had been filled. All the operations made necessary by the abrasion and fracture of enamel from time to time, and because of imperfection in the fillings before introduced, were performed previous to the insertion of the crown in the space left by the loss of the lateral incisor, and as this crown and each cavity and pulp-chamber was prepared for the gold, all appeared as here illustrated (Fig. 10).*

Fig. 10.



Gold wire (No. 13), with a sharp thread cut upon it, was screwed into the dentine, and, at the same time, all the interstices between the tissue and the gold were filled with oxychloride of zinc. When crystallization had taken place some of the cement and dentine was removed from around the wire with a small bur, and a groove was cut in the dentine near the margin of the root so as to secure proper and sufficient anchorage for gold; cohesive foil (principally No. 30) was impacted into these parts, and the entire contour of the crown was restored with the electro-magnetic mallet. This crown was not faced with porcelain, because the teeth of the gentleman for whom these operations were performed are but slightly exposed to view; and then, too, the gold had to be placed over the enamel to support and protect it along the cutting edges of all the incisor and the cuspid and bicuspid teeth. A gold screw was placed in the pulp-chamber and extended into the crown of each bicuspid tooth. The apical foramen of each pulpless tooth was closed, and the whole of each pulp-chamber, into which a wire was not placed, was filled with gold. With a properly adjusted electro-magnetic mallet, carefully guided, and operated with a full current of electricity from a freshly charged four-cell Bunsen battery, the contour of each crown was restored with gold, made solid and perfect throughout; the foil was placed over the finely prepared margins of enamel, which were not marred in the least (Fig. 11).

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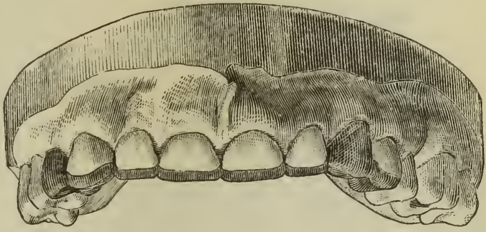
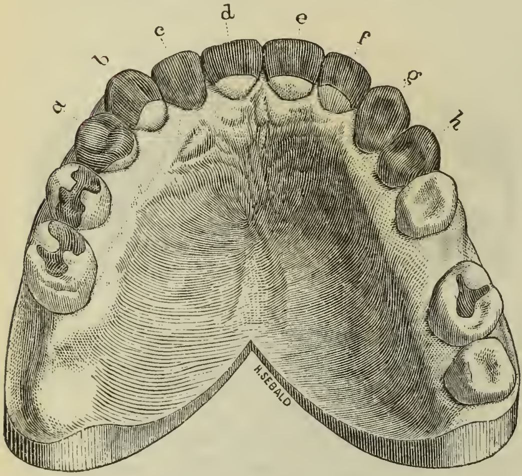
* This cut illustrates the case well, though there are parts and grooves in which to anchor the gold that are not distinctly shown. M. H. W.

FIG. 11.



The lower incisor teeth had so changed after the loss of the upper lateral that they almost closed upon the gum. This was partly owing to the abrasion of the remaining teeth, and in part due to the lower incisors gradually rising in the alveolar process. Because of such occlusion of the teeth a porcelain crown (plain "plate tooth") with "cross-pins" was used, and fitted and soldered to the gold wire, there being no space for a backing of plate. When the wire was prepared, the porcelain grooved and fitted to it, and ready for the placing on of the gold foil, the whole appeared as illustrated (Fig. 10); the wire extending into each root about four lines. The cutting edge of the porcelain was removed to the same extent as that of the abraded and prepared incisors, so as to present the same appearance and have the gold support and protect the remaining part. The wire of the crown was held in a hand-vise, while cohesive gold foil was placed solidly in the grooves, around the wire, over the cutting edge of the porcelain, and the entire contour restored with the electro-magnetic mallet. During the final fitting of the crown, it was made to so rest against the gum that the blood was pressed from the capillaries of the part. When ready for insertion, light medium rubber dam was applied to two teeth each side of and across the space which was to receive the crown; small barbs were made all around the wire with a sharp knife, and oxychloride of zinc was then placed in the pulp-chamber of the central incisor and cuspid, and the crown at once pressed to place. After it had been in position an hour to allow of complete crystallization of the cement, portions of this and of the dentine were removed with a small bur so as to better secure the crown and obtain anchorage for the gold foil then to be put in place around the wire, into each cavity, and over the prepared margins of enamel. Principally No. 30 gold (one-quarter ounce cohesive foil) was used in this case, and all was impacted with the electro-magnetic mallet, except a few pieces of light foil placed in the space between the wire and cervical wall, and even these pieces were gone over with this very valuable instrument after they were in place. With this and all the operations completed, the case appears as here illustrated (Fig. 12).

Fig. 12.



Finished case—*a*, *b*, *d*, *f*, *g*, and *h*, pulpless teeth; *g*, whole crown restored with gold; *a*, *f*, and *h*, almost entire gold crowns; the teeth *b* and *d* support the gold crown faced with porcelain, *c*, and fully one-fourth of the crown of each of these is restored with gold, as is also that of *e*, the pulp of which is living.

All those who have the ability and who will work earnestly and conscientiously to properly perform the various operations described, and do their very best in every case, can so manage their practice that it will not be necessary to cause any of the patients they have charge of to wear artificial crowns mounted upon plates.*

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* These notes on "Operative Dentistry" will be followed by other articles descriptive of special operations.—M. H. W.

CLEANING TEETH.

BY GEORGE A. MILLS, BROOKLYN, N. Y.

(Read before the First District Dental Society of New York, October 7, 1879.)

How many people who call upon the dentist for his services understand the full import of the heading of this article? How many dentists have anything like a fair degree of understanding regarding this matter? How many dentists make it the first consideration in their examination of the mouth? I think I can profitably suggest a few directions that would come under the head of practical hints to the dentist, if accepted and followed, which will bring so much satisfaction both to the patient and operator as to permit of no future departure from the practice.

I frequently hear the remark, "Who does not clean teeth?" I answer, "Who does?" A few do; but a close observation proves very conclusively that there are but few in the profession who work with any considerable degree of zeal in this direction. Patients call to have their teeth examined, and the common practice is to look for decayed teeth. I say the *common* practice; though I do not think this is altogether so because of ignorance or wickedness; and yet to some extent it may be a little of both. As dentists we are morally bound to save teeth, and to do this we must secure healthy surroundings for them. What does it profit the patient to have teeth filled if the diseased conditions of the contiguous parts are destroying the gums and sockets?

Cleaning teeth has heretofore had regard too much to the facial appearance,—the improvement of a few front teeth. The operation of cleaning teeth means, according to the present day standard, the removal of all accumulations or stains from the cutting edge to the apex of the root (if it is exposed). As a rule this should be the first step; then the real condition of the teeth becomes apparent. This operation is, indeed, the only true method of examination. A patient calling to have the teeth examined should be informed that an appointment must be made, which, as a rule, will be readily agreed to. At the appointed time commence and clean each and every tooth. If there be deposits of salivary calculus remove them, I should say *à la* Riggs, but at any rate by some method by which thoroughness can be secured, as by using corundum disks, etc. For giving a smoother surface Arkansas-stone disks, with the free use of water, are very efficient. A very effective method for polishing about the necks and other surfaces of the teeth is to place a fissure bur in the engine, and winding about it a piece of cotton, make it an elastic cone. Another valuable method is the use of the string and tape polish (which I described in a series of articles on the so-called Riggs's disease, published in the DENTAL COSMOS, 1877), to be used with moistened pumice, chalk, and tooth-powders. The final polishing should be done with the brush wheel and the engine, using the polishing materials above referred to. If these operations have been performed as thoroughly as they ought to be, the beneficial results will be so apparent that I think the method will impress the operator so much that he will not hesitate to make it the rule of his practice. Depend upon it, no service performed by us will call forth more real appreciation than this. A service of the nature I have described will, in ordinary cases, require at least one hour's time; but many cases will need much more. An hour of our time has been thus consumed, but is acknowledged by the patient to have been well spent. The remark so often heard in our societies and from those who ought not to make it, that patients will not pay for the time spent in such operations, is not true; they will pay, and liberally too.

This matter of cleaning teeth should be well considered by young practitioners, for they can in no other way so surely secure a successful practice as by starting on these fundamental principles. He who adopts as his motto "Clean Teeth" need have no fear for the full employment of his time. A dentist deficient in all the other departments of practice, but earnest as to the cleanliness of teeth, will be more successful in saving them than one more efficient in general practice and neglectful in this particular. In all the discussions of our societies, how little is said upon this subject! Clean teeth means, also, a healthy mouth. More time should be given in dental schools to impress the importance of this subject on the minds of pupils. I have visited some of the schools, and have quizzed the students on this matter, and found that it was receiving but a passing word in the teachings. But I need not have quizzed to find that out. A silent but undeniable witness told the true story as I passed from chair to chair in the clinical department. Not in a single instance did I find this matter receiving any attention. I would suggest that some student should have a clinic on his own teeth first, by some one who has the matter at heart and understands the full import of it; then have the students operate in like manner upon each other. By this means an impression can be made which would be a fitting supplement to an earnest effort in the lecture-room.

How constantly we hear the assertions of those who have tarried long at the chair that "dentistry is a failure"; that "sooner or later the forceps must end it"; and that "dentists do more harm than good"; with exclamations about the "incompatibility of filling material," "defective operations," "cohesive gold," etc. Now, let each one ask himself, "Have I given the attention to this subject which it deserves? Have I fully demonstrated the value of it in my practice?" Only a few days since one of our most brilliant fillers acknowledged that he had not given his attention to it as fully as he felt he ought to have done. We must reverse the order of our clinics. If we will make this service occupy the first place in the clinic-room, it will have a potentiality that will be productive of great good. Until this is done we make an almost useless expenditure of time and mental energy in trying to solve the problem of saving teeth. Of course I do not mean to be understood that this will settle the etiology of dental caries. As a truism, defective tooth-structure admits of the possibility of decay—the typal tooth will resist it.

All uncleanly and unhealthy mouths favor disease of the soft as well as the hard tissues, and the result, in the non-resisting constitution, is deterioration to a greater or lesser degree. It is not at all uncommon to be able to trace directly to the unhealthy conditions of the mouth and teeth local diseases, as of the eyes, ears, nasal cavities, or vocal organs; while in not a few cases the mucous membrane is deranged from the lips throughout the entire alimentary tract. The more attention I give to this subject, the more I am confirmed in the belief that we have as yet but a faint conception of the deleterious effects upon the general health of a diseased oral cavity.

We should be earnest in following out the line of practice which I have recommended, for we have the responsibility of keeping healthy this vestibule of the human body. I predict that the time is not far distant when the general physician will acknowledge the results of intelligent practice by us in this direction. We have come to understand that all inflammatory action is chemical, and that it is the result of invasion. In its incipiency it may be circumscribed, and in proportion as constitutional resistance is active it is held in check until systemic complications intensify it. Nature is unable to perform the extra duty, and the rallying of the vital forces to the one point or other of attack often reveals an unknown weakness.

Had I not seen so many phases of disease which had at first but a simple expression, but which afterwards became complex by reason of association, I could not have felt the interest which I do in this subject. I trust and believe that additional testimony—demonstrated practice—will convince both practitioners and patients of the absolute necessity for clean teeth.

(To be continued.)

ECLECTICISM IN DENTAL PRACTICE.

BY J. HENRY REDMAN, D.D.S., BRIGHTON, ENGLAND.

ALTHOUGH for nearly two years a wordy war has been waging between the advocates of the so-called "New Departure" and "Accepted Creed," we do not seem to be any nearer the end. The principles of the "New Departure" seem to have been misinterpreted, both by the supporters and opponents, who have nearly all formed the idea, if one may judge by their writings, that it advocates the exclusive use of plastic fillings; but, as far as I am able to judge, when first elucidated in the very impartial editorial in the DENTAL COSMOS for March, 1878, it simply recommended the adoption of eclecticism in practice. By the introduction of side issues it has become so distorted that I should imagine the original propounders can scarcely recognize their own offspring. There are some points which very few would subscribe to; for instance, "A filling may be the best known for a tooth and yet leak badly." This is a very illogical deduction, as it is on the exclusion of all moisture that the success of a filling depends. Allow the fluids of the mouth to have access to the dentine, and disintegration would soon result. Failure in operations is due as much to defective manipulation as to incompatibility of filling material with tooth-bone.

I agree with the opinion expressed by Dr. Barrett, in his paper read before the New York Odontological Society, "that the return to plastic fillings is the adoption of a practice which has been proved inferior," if by that he means the abandonment of gold as a filling material. As the introduction of vulcanite lowered for a time the standard of mechanical dentistry, so, I firmly believe, would the exclusive use of plastic fillings lower the standard of operative dentistry. At the same time, I cannot go so far as to say that every tooth worth saving should be filled with gold. Extremes are bad in any case. A man who uses materials best suited to the particular case in hand does his duty to his patient more faithfully than one who confines his practice to one class of work, whether applicable or not. A good amalgam is far better than a bad gold filling; but when it is applicable nothing answers so well or is so permanent as a *properly*-inserted gold filling. "That amalgams do protect the teeth for the period during which they remain in contact with the walls of the cavity" no one can deny. But how long do they remain in contact? I contend that the majority of the amalgams in use shrink, or alter their form in hardening, so that the period during which they are in contact with the walls of the cavity is very limited, and as a consequence the fillings are merely temporary. No experiment performed in the laboratory can be carried on under the same conditions as occur in the mouth, and cannot, therefore, be entirely conclusive; but if a tooth is filled with amalgam and subjected to the aniline test, my position will be proved.

During the last five years I have followed an eclectic practice with satisfaction to myself and patients; not using gold because I like it best, but choosing the material that would give the best result.

A combination of soft and cohesive gold is far better than cohesive alone. The soft foil is used in the form of cylinders, rather longer than the depth of the cavity. The mode of procedure is as follows: Take, for example, a compound cavity, proximate and crown, in a bicuspid or molar. After proper excavation place three cylinders against the cervical edge and consolidate well, first with foot and afterwards with sharp-pointed pluggers. When this is done the cavity should be about a third full; the remaining two-thirds should now be filled with cohesive foil, obtaining an anchorage in the gold already in. (If the tooth is of a low type, substitute tin for the soft foil.) By this mode of practice better adaptation is obtained at the cervical edge where failure is apt to occur than would be the case with cohesive gold, and this latter withstands the wear of mastication much better than the soft gold. In crown or simple cavities, place the cylinders around the walls and fill in the center with cohesive gold, being careful to consolidate the cylinders at the bottom of the cavity before proceeding to the next stage of the operation, pressing them well against the walls as the filling progresses. Cohesive gold is a most beautiful material in its proper place, but its abuse (combined with heavy malleting) has brought gold into disrepute with many operators.

As an amalgam, precipitated palladium, when properly manipulated, stands pre-eminent; there is not the slightest shrinkage in it, and although after a few days it becomes as black as jet, yet there is not the least discoloration of the tooth. In large cavities a layer of gutta-percha should be first placed at the bottom to prevent irritation to the pulp.

Where a white filling is required gutta-percha has no rival; but, as it is readily worn away in the process of mastication, it should only be used in those places where it would be free from that liability, or, if it is otherwise used, the patient must be warned of its temporary character. The oxychloride and oxyphosphate of zinc fillings readily fail at the cervical edge, but if a layer of gutta-percha is placed at this point and the remainder of the cavity filled with a good oxyphosphate cement, a fairly permanent result is obtained.

CLINICAL REPORTS.

PHILADELPHIA DENTAL COLLEGE, DEPARTMENT OF ORAL SURGERY.

Clinical Service of Prof. J. E. Garretson.

Case I. Tumor of submaxillary triangle. The patient before you, gentlemen, is from Pittsburgh, in this State, and comes to consult us about the tumor that you see occupying the location of the submaxillary gland. The growth, as you will remark, is about the size of a hen's egg; it is hard, movable, painless; its age is four years.

What is this tumor, and what is to be done with it?

Imprimis, we know all about the growth or we know nothing about it. To put the assertion in other and perhaps better words, the tumor is one having in itself its own explanation, or it is what in this clinic we class with the neoplasms.

The growth is associated with the stroma of the submaxillary gland. Why has the gland taken on hypertrophy? Why has it not continued as its fellow of the opposite side? I have gone over the subject of diagnosis by exclusion too often with you to require a repetition in this case. I do not know, I am not able to discover, any local or common specific constitutional condition that explains the enlargement before us. I pronounce, therefore, that we have a neoplasm to deal with. What is the histological expression of a neoplasm? I have, at present at least, not the slightest concern to trouble myself anything about the histological expression. If you like I will call the tumor, with equal facility and justifiable freedom, sarcoma or scirrhoma.

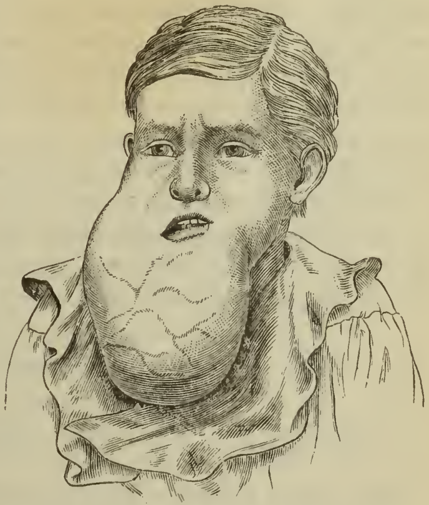
What is to be done for this case? Cut the tumor out? Nobody knows what better to do with a neoplasm than that. With all tumors of the first class—namely, tumors having within themselves their own explanation—we know of treatment much better and more scientific than the knife, but in the presence of a neoplasm knowledge stands with a hand over her mouth.

To cut a tumor out having such deep seat as the one before us requires that the operator be not at odds and ends with his anatomy. The tumor is in the submaxillary triangle. External to it are skin, superficial fascia, external jugular vein, and external leaf of the triangular fasciæ. Beneath it are internal leaf of fasciæ, hyoglossus and stylo-glossus muscles, facial artery, hypoglossal nerve, lingual artery, mylo-hyoid muscle, and mucous surface of mouth. Back of it is the stylo-hyoid ligament, which alone separates it from the parotid gland. Near it, quite near enough to be in the way of an accidental slip, are the carotid artery, the deep jugular vein, and the pneumogastric nerve.

We now etherize the patient and proceed to the operation.

(The ablation of the gland was accomplished by making an incision two inches in length parallel with the base of the lower jaw. The tumor was next thrust forward into this cut by the finger of an assistant, forcing it from its bed beneath the bone. Next a vulsella caught the growth, and, while in constant process of twisting, the gland was in great part enucleated by means of an ivory blade, the cutting edge of the knife being used only to divide attachments too firm to be torn. The ablation was accomplished at the expense of a single ligature. . . . Four days later this patient was shown to the class entirely well, and with a scar so trifling as not to be noticeable beyond the second row of benches. The union had been by first intention throughout.)

Case II. Osteo-encephaloma of inferior maxilla. The next patient is this little boy, who is brought by his parents from Juniata County, with a view to consultation. The gentleman at my right is the lad's physician who accompanies him. The case is a sad one. I think that when you look at this little boy, who is only five years of age, and observe how out of all proportion to his power of endurance is this great tumor that is fretting the life out of him, your sympathy will be fully aroused.



What is this tumor? What is to be done for the child's relief?

The tumor, it is to be repeated, is a self-explainable growth or it is a neoplasm. If the former, it is easily to be understood and as easily cured. If the latter, there is no remedy; neither is there prospect of relief.

If the tumor is benign, we will find its explanation in one of twelve conditions. If explanation be found in none of these conditions, then by and through the absoluteness of the law of exclusion we shall know the growth to be malignant.

We proceed to study the diagnosis in connection with these twelve conditions; they are, namely,—

1. Periodontitis.
2. Periostitis.
3. Hypertrophy of submaxillary gland.
4. Abscess of contents of submaxillary triangle.
5. Ranular hygroma.
6. Hygroma of supra-hyoid bursa.
7. Inflammation from luxation or from comminuted fracture.
8. Exostosis.
9. Aneurism.
10. Hydatids.
11. Caries.
12. Necrosis.

* * * * * * * * *

(An hour was consumed by the lecturer in a study of the conditions named in reference to the case before the class.)

I think, gentlemen, you will accept that I have clearly demonstrated the tumor to have its existence in none of these conditions. It is then a neoplasm, for the reason that there is nothing else that it can be. What kind of a neoplasm? The kind, as treatment is concerned, makes as little difference as with the other. A neoplasm is a neoplasm. The microscope may show you the histological expressions of scirrhoma, of sarcoma, of myxoma, of myeloma, of encephaloma, but it combines with these showings no varying specifics; indeed, it suggests no specific at all. The treatment of a neoplasm lies in no specific, in no known antidote. A neoplasm is to be cut away from the body corporate, or it is to be let alone.

Can this tumor be cut away? Yes; but the cost would be the life of the child. Death would occur upon the operating table, or if not there, then quickly from recurrence of growth. In the presence of this tumor your professor stands powerless.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN DENTAL ASSOCIATION.—NINETEENTH ANNUAL SESSION.

Third Day—*Evening Session.*

The association was called to order at the usual hour, President McKellops in the chair.

"Operative Dentistry" was passed, and the Fifth Section, Anatomy, Physiology, Histology, Microscopy, and Etiology, was called. Dr. Dean, chairman, stated that at the organization of the section the various departments had been apportioned to different members, but there would be reports from only two, Dr. Peirce and himself.

He had taken for his subject "The Origin of those Nests of Denticles generally denominated 'Dentigerous Cysts.'" He did not pretend to have solved the question with absolute certainty, but giving the conclusions reached, and the histological and physiological facts upon which they were based, left it to the association to judge of their correctness. The only histological account of these anomalies of any value is recorded in the transactions of this association for 1875. While the mode of their origin there advanced is not in accordance with well-established facts, the suggestions pointed in the right direction. The initial error was in regarding the tooth-germ as a single cell instead of an aggregation of cells. It was suggested that a tooth-cell might generate other tooth-cells, and from these latter these partially developed teeth might originate. The following facts are submitted as the foundation of the theory here proposed: The enamel of the teeth is developed from an epithelial or epi-blastic layer; the dentine from the dermal or meso-blastic layer. The enamel organ penetrates the embryonal tissue, and becomes largely developed before the slightest trace of the dentine papilla is seen. There are many facts to bear out the theory that the development of the latter is induced by and through the presence of the former. Upon examining subjects soon after the rupture of the epithelial cords which had connected the dental follicles with the epithelial layer of the mucous membrane, large masses of epithelial cells will be found attached to their extremities, and sometimes detached aggregations of these cells are found scattered in the embryonal tissue. These epithelial proliferations vary greatly in quantity, and usually disappear before the teeth are fully developed. Dr. Dean believes that under favorable conditions these epithelial masses may, more or fewer of them, become imperfect enamel organs, inducing the development of corresponding dentine papillæ; and that these two tissues may pass through the successive phases of development of the normal dental organs. In corroboration of this view he mentioned the fact that we find occasionally development of the teeth in various remote parts of the system, the bladder, the scrotum, the vagina, the eyebrows, etc., and in the ovaries. These are admitted to result from some epidermal cells which have become invested within the dermal tissue, which may more naturally occur in the jaw than in the remote regions named.

Dr. C. N. Peirce expressed regret at his inability at the present time to present to the association a synopsis of the labors of the German histologists during the past year upon cell development, for he understood that much in that direction had been accomplished.

He took great pleasure and intense satisfaction in bringing to the notice of the association a work from the hands of the chairman of the section, Dr. M. S. Dean, on the "Dental Follicle," advance sheets of which he had had the honor of reading. It was a translation from the French authors, Drs. Legros and Magitot. He would warmly commend it to all of those who desired to become familiar with the origin of the tooth-germ and its subsequent development. It was especially adapted to the student by the familiar conversational style in which the translator had presented it. It was indeed a book that every earnest seeker after truth concerning this complex portion of the human economy must possess.

Dr. J. G. W. Werner, Boston, had intended to present a paper on "Nitrous Oxide," but he would merely submit some physiological observations on its action. To assist in conveying his ideas he had placed on the blackboard a chart showing under eight heads the different stages of the action of nitrous oxide when inhaled into the lungs. He did not claim originality for the views he should put forth, but ascribed the credit of the investigations which had led to the conclusions reached to Prof. Zuntz, of Poppelsdorf, Germany. In the first place, nitrous oxide narcotizes; which is shown by the increased frequency of respiration and increased frequency of the heart's action. In the second place, it asphyxiates, which is shown by the fact that when inhaled the power of reflex action is lost. It has been considered by many in the dental profession that nitrous oxide has no other effect except asphyxiation, but that this idea is erroneous is proved by the fact that, in the third place, it anæsthetizes, and that complete anæsthesia is brought about only by a thorough combination of narcotism and asphyxiation. Fourth, in asphyxiation by nitrous oxide the feeling as of want of air is much less than in common asphyxia, and convulsions are either entirely absent or but very feeble. In the fifth place, we have three characterized periods: the first, of predominating inspiration, wherein the patient inspires very freely; the second, of predominating expiration, wherein the expirations are free and forcible; the third, wherein gradually lessened and fainter-growing inspirations appear until a definite paralyzed condition of the center of respiration is set up. In the sixth stage we consider the frequency of cardiac systole and diastole. In breathing pure nitrous oxide the frequency of the heart's contraction and dilatation decreases from the beginning, but not nearly as much as when an undifferentiated gas is breathed. In the seventh we have the two periods of increased blood-tension, which should be known to every one who administers nitrous oxide, so that he may know when, if ever, it becomes dangerous. The first increase of blood-tension is noticeable during the asphyxiating period, but it is not usually so strong as the second, which occurs when recovering from the effects of the nitrous oxide. It is this increased secondary blood-tension upon recovery that may especially become a point of great danger. There are oftentimes more than two periods of increased blood-tension following each other: first, a contraction, then a dilatation. The eighth and last point to be considered is apoplexy. To know this fact and the point where its symptoms begin is the most important to all who administer nitrous oxide. The danger of increased blood-tension is greatest, as before stated, when the individual is recovering. Where there is a tendency of the blood-vessels to freely and easily dilate, a distention may be set up from which there might be no recovery. In persons who have never fully recovered a very great dilatation of the vessels of the heart and brain has been discovered. In any case where an apoplectic diathesis is suspected nitrous oxide is strongly contraindicated; but it is, comparatively speaking, the safest anæsthetic known, and fortunately those who take it most are not usually of an apoplectic diathesis.

Dr. Edmond Osmond has had considerable experience with nitrous oxide. The immediate effects of its inhalation are not all we have to consider; many instances of headaches, paralysis, and sometimes insanity following it. Women especially are liable to accidents from it. There is a time (during the catamenial flow and for a week previous) when it should never be given to them; at the change of life also its administration to them is dangerous. During the hot weather it is not advisable to give it.

Dr. C. N. Peirce commended Dr. Werner's remarks because of the lesson of caution they teach us. He has patients who have suffered and still suffer from the effects of nitrous oxide. Dr. Peirce briefly sketched several cases of serious illness coming under his observation, directly traceable to it. One of these, a physician, lost forty pounds in weight, and was a constant sufferer from diabetes; another never knew a well day from the time he took the gas, and, after suffering a year and a half from diabetes, died; several ladies within his knowledge had not recovered from its effects in six or eight months.

Dr. W. H. Atkinson reminded the members that a year ago he had told them the same things that Dr. Werner to-day brought to their attention. How many know what blood-tension is and how it is to be controlled? All anæsthetics are dangerous. There is no such thing as physiological action of nitrous oxide on the human body. If its action is physiological, then it is compatible with health. Ninety-six per cent. of the oxygen taken into the lungs in breathing is rendered unfit for reception into the blood column in the capillaries of the air-vesicles, at the same time that four cent. of the oxygen in the inspired air is taken up by endosmosis. Nitrous oxide is not a supporter of respiration, and cannot contribute to the molecular change necessary to the continuance of systemic life.

He would ask if any gentleman present, after the demonstration given, would be able from this showing to say he was strong enough to know when to administer nitrous oxide? Where is the man who can diagnose the apoplectic tendency?

Dr. Werner. Narcotism is a lowering of tonicity of the neural current. Blood-tension is hardly to be comprehended by those who have not studied it theoretically and practically. He is opposed to the administration of nitrous oxide by the average dentist, as there are very few who have the requisite knowledge of its properties and effects. If the various stages demonstrated are carefully observed, its administration is allowable, but we must be careful not to permit the patient to pass to the stage where there is no expiration. It is a difficult matter to decide when the system is not in a proper condition of oxygen holding,—that is, not supplied with enough oxygen in the tissues. Apoplectic diathesis is very difficult to diagnose where no active symptoms have ever disclosed its presence. We can usually in such cases only get at it from the family history. Chloroform is the most abominable and dangerous thing ever used in the healing art. More persons die from its effects when taken for the extraction of teeth than when taken for capital operations. This is probably because the nerve immediately affected by the extraction arises near the vagus nerve; for it is likely the close connection the vagus nerve has with the posterior or motor root of the trigemini which makes all operations involving the latter nerve, under chloroform narcosis, so dangerous.

Dr. C. W. Spalding gave accounts of two cases of young ladies who have never recovered from the effects of nitrous oxide.

Adjourned.

Fourth Day—*Morning Session.*

The association met at the usual hour, President McKellops in the chair.

The newly-elected officers were installed, Drs. H. A. Smith and H. W. Morgan escorting the new president, Dr. L. D. Shepard, to the chair. Dr. McKellops, on retiring, briefly returned his thanks for the courtesy with which he had been treated by the members during his incumbency.

Dr. Shepard, on taking the chair, returned his thanks for the honor conferred on him by his election to preside over the deliberations of the association, which had always stood first in his estimation as a means of advancing the education of dentists.

The Fifth Section, Anatomy, Physiology, Histology, Microscopy, and Etiology, was declared still open.

Dr. W. C. Barrett regretted that he had been unable to perform some physiological experiments before the section, which he had contemplated, but hoped to be able to do it another year. That could be made an important feature.

The Fifth Section was passed, and the Sixth Section, Pathology, Therapeutics, and Materia Medica, was called, and Dr. F. M. Odell stated that they had no report prepared.

Dr. W. H. Atkinson had a word to say as to the multiplicity of terms and the ambiguous meaning conveyed by them. Pathology is derived from the Greek *pathos*, feeling, and *logos*, speaking, discourse. Its meaning is covered by and included in physiology, and the ambiguity arising from the use of both will be seen all through our discussions. Just as fast as we can purge our nomenclature of the multiplicity of significance of the words we use, so fast will we arrive at certainty of expression. Only one-half per cent. is enough to begin on. He is not discouraged that there is no report from some of the sections. He did not expect the new plan of working to begin perfectly smoothly. Too many are bound by accepted (not proved) methods. We must go to work to revise the studies we have pursued and carefully purge the text-books, and after purging them gather what is left and see if there is one-half of one per cent., and then go forward to our task, each with the spirit that it is *our* work, not *my* work.

The Sixth Section was passed, and, on motion of Dr. C. S. Stockton, a vote of thanks to the retiring officers and the local committee was passed.

Dr. C. N. Peirce stated that he had been interested in collecting statistics respecting the deficiencies in the number of the permanent teeth. It has been asserted, and by many believed, that in the human family, or *genus homo*, there is a marked tendency to a permanent reduction in the number of these organs by the non-development of the third molar, or wisdom tooth, and the superior lateral incisors; and it is only by recording our observations that any reliable information can be gained upon the subject. He would therefore be greatly obliged to any member of the profession who would take the trouble to report to him all such cases, giving the names of the teeth which were deficient, the age of the patient, and whether any more than one member of the family had a similar deficiency. This is a matter of some scientific importance, and it was in the interest of science that he made the request.

Adjourned.

NEW YORK ODONTOLOGICAL SOCIETY.

Regular meeting, held at the residence of Dr. C. A. Woodward, No. 361 Fifth Avenue, on the evening of June 17, 1879.

The president, Dr. A. L. Northrop, in the chair.

The secretary, Dr. Jarvie, announced the reception, for the society, of a work from Dr. Rottenstein, Paris, France. The thanks of the society therefor were voted.

Incidents of Practice.

Dr. S. G. Perry, New York. Four or five years ago, Dr. Corydon Palmer spoke to me of the advantage of the use of unannealed gold foil. He referred to gold taken directly from the gold-beater's skin. He claimed that the first and only annealing that gold foil should have should be after it is prepared for use in the cavity; that being so prepared, and receiving *as little* hand-pressure or mallet force as consistent with thorough condensation, gave the softest form of cohesive gold.

I procured a book of such gold and gave it a trial, but did not get the good result I had expected.

Six months ago, Dr. Palmer reiterated his first statement, adding that if the gold be heated to near the melting-point in annealing he was certain it would give the softest form of cohesive gold.

I procured some more of the same gold and made another trial, this time following his suggestion more closely and heating the gold to a uniform white heat. The result has been a complete confirmation of his opinion. I have been so well pleased with this gold that I have not since been content with any other kind in any part of any cavity where I desired strictly cohesive gold. I now think that my first failure was due to the fact that I then used gold which was to some extent in a semi-cohesive state, and I think the good qualities of this gold are only developed by the uniform use of the greatest heat it will bear.

Considered theoretically, it seems to me that there is good reason for believing this to be the best form of gold for strictly cohesive use. We know very well that in the laboratory a piece of pure gold plate becomes softened by annealing to a white heat. We also know that by even bending such a piece of softened plate we slightly harden it; by hammering it we harden and stiffen it very greatly. Now, a leaf of foil is only an attenuated piece of gold plate, and must be governed by the same law that controls the thicker piece. If the foil be annealed and placed in a flexible book for transportation, and folded or rolled before using, it must become more or less stiff and hard before it reaches its place in the cavity. The inherent stiffness it has acquired after such handling, and the cohesion of all surfaces in contact, coupled with the fact that such gold is not easily made into compact rolls or mats, and must therefore bear much crushing before being condensed, makes it difficult to adapt such gold to delicate walls.

But the unannealed gold, coming directly from the skin, as Dr. Palmer says, with the "pores closed," will bear any kind of handling without affecting its qualities after annealing. It can be folded into very compact mats, or rolled into very tight rolls, and cut in short pieces. Each mat or piece being heated to a white heat can then be placed in the cavity and condensed with but little disturbance of its whole mass, and consequently with but little hardening. You would expect such masses of gold to be hard and difficult to manage. So they are; but they are softer and more manageable than any other form of gold that is equally cohesive.

As you may know, Dr. Richmond favors this method of using this form of gold.

There is still another point in connection with this gold that I think worthy of consideration. As I anneal each piece only as I use it, that which is on the tray folded for use I leave exposed to the air of the room for any length of time. It is not likely to accumulate any more dirt on its surface than has already come from contact with the skins between which it was beaten. Gases do not seem to condense upon it, owing, perhaps, to the first layer of grease or dirt derived from the skins. It seems to be as well protected from gases as gold foil subjected to ammonia, as described by Dr. Black in an article on the subject in the first volume of the *Missouri Dental Journal.* Perhaps Dr. Palmer would say that it has less affinity for the gases of our furnace-heated houses, because its pores are closed.

Heretofore, in the use of gold foil, it has been my habit, in all cases where I wanted a strictly cohesive gold, to use only that which was taken fresh from the book,—the book itself being kept under a weight in a closed drawer. For a long time I have had the feeling that gold foil left exposed to the air for any great length of time *after being annealed* could never again be made quite so cohesive as at first. I may be mistaken in this, but so at least it has seemed to me. I remember that Dr. Varney would never re-anneal and use a piece of gold that had fallen on the rubber dam.

But with the unannealed I can see, or imagine, no difference after long exposure, for the whole treatment, up to the time the gold is ready for the annealing flame, has been one of exposure. One word more. Perhaps the fine, soft quality of the unannealed gold will be best shown by the use of a clean burnisher after the packing is finished. If not overpacked the gold will not be "bumpy," but will rub down smoothly, giving beautiful margins. Whether this form of gold can be made as absolutely cohesive as any other kind I am not able to say, but it seems to be sufficiently so for all practical purposes. It should be well annealed to get its best qualities.

I have not used the unannealed gold as soft foil to any extent. I have tried it a little but have not liked it as such. There are other kinds of soft foil that I like much better, and of which I use a great deal.

If Dr. Palmer's reasoning is correct, this foil, unannealed, should not be as soft as other foils. The beating must have stiffened it and rendered it brittle, as it would a piece of plate, and if you observe it closely you will see that such is the case. It is stiff and harsh and rotten to a great degree. The absence of the cohesive property allows its surfaces to slide on each other, giving it the appearance of being soft. Just here, unless we observe closely, it is very easy to be deceived.

Dr. Benjamin Lord, New York. I have found that the unannealed gold, to be annealed as it is used, has an advantage in two respects —under certain conditions—over gold that is annealed by the manufacturer, viz.: 1st, in the putting of it up into rolls or pellets it is not at all stiffened by the handling; 2d, gold is always more cohesive when freshly annealed than after it has been in the books or exposed to the air for more or less time.

There is a marked difference in the cohesive foils of the different manufacturers, that of some being very much more cohesive than that of others. I have used foil when freshly annealed by the manufacturer that was quite as cohesive as that which is annealed at the time of using it. Unannealed gold can be folded into strips or ribbons without stiffening or hardening it, and I think that this is the best form in which to use cohesive foil.

It is very certain that the annealing by the manufacturer is likely to be more uniform, and if we can as well be spared the annealing, we shall save much valuable time. Then I am inclined to believe that foil annealed in a flame is not so pliable in the working as that which is annealed in a muffle, as the manufacturers do it. I suppose all understand that when foil has lost more or less of its cohesiveness it may be restored by holding it over a flame of alcohol, near enough to heat it thoroughly, but not to give it a red heat.

Dr. Clowes. It is refreshing to hear something about gold once more. Of late that subject has been almost tabooed in our societies. Dr. Perry is correct in what he has said in reference to gold foil, and I am surprised that he has, until now, kept the discovery to himself. Dentists, we know, are very much troubled by the peculiar difficulties which beset them in the manipulation of gold, and if what has been said is practically true, the offering is indeed valuable. The paper on "Gold," by Dr. Black, read before this society in 1874, is full of truthful interest, and should be read and mentally digested by every member of the profession. From it I learned that certain gases would gather upon the surface of my foil and affect it harmfully; that, by keeping it in a position where ammonia could reach it, the inimical forces would be overcome and dispelled. Keep sulphur and anything containing sulphur—as matches or rubber dam—as far from your foil as possible. The fumes from sulphur, in this regard, of large or small amount, are troublesome, and are apt to incite to profanity. I get the benefit from ammonia by placing the crystals in a wooden box with perforated lid (one small hole) in the drawer beneath the one containing my gold. Dr. Black has given us a great thing, and we ought to appreciate it.

Dr. O. E. Hill, Brooklyn. There seem to be various opinions on this subject. Dr. Perry heats this gold to a red heat, while our president uses it in all ways. For myself, I cannot see what effect the ordinary atmosphere can have upon gold, when used as we use it; that is, used very soon after its manufacture. The vicinity of a sulphur manufactory might be detrimental to it. I believe all gold foil is ruined by heating to a red heat after its manufacture. I have yet to see gold foil that is not hardened by such use. Rolled gold will be softer after being heated red; but beaten foil hardens.

Dr. William T. La Roche, New York. I think most of the gentlemen have lost sight of one very important point in annealing gold foil,—it makes a great difference whether the gold is pure or not. Manufacturers of gold foil alloy differently, consequently some foils contain more alloy than others. The more alloy there is in foil, the more it will stiffen when annealed; but pure gold will always give the same results; I use that only (as pure as I can get it). In annealing I heat it to a white heat and bring it out of the flame gradually, and it is cohesive. If you bring it from the heat and let it cool quickly, it will be brittle and stiff. I have also annealed gold between pieces of mica, and allowed it to cool between the same slowly, with like results. This is my experience in annealing gold foil.

Dr. A. C. Hawes, New York. Is gold directly hardened by annealing, or is this seeming hardness really due to another cause? I think the latter. A rope or cylinder of foil will display on cross-section a multitude of angular convolutions, which touch each other only at their angles, and adhere to each other at those points; thus making an infinite series of little arches, tubes, and various figures, which, in packing, we have to break down in order to solidify the whole. The extra resistance offered by the multitude of these little arch-forms becomes plainly apparent to us, and we are apt to think the gold harder. It is really harder to manipulation; but not, I think, intrinsically so.

Dr. E. A. Bogue, New York. I would ask for light upon the treatment of short teeth. I have cases in which the molars and bicuspids are so short that the lower incisors touch the upper gum inside. What course should be pursued to get the upper incisors back where they belong, and to lengthen the molars and bicuspids?

Dr. William H. Atkinson, New York. I should simply put on such fixtures as would elongate the short teeth and push the others back. I have succeeded repeatedly in having the incisors retained without any appliance at all and just in any position I chose. The superior maxillary bone of the human body will stand maltreatment better than any tissue known.

Dr. Bogue. I am obliged for the good will of the doctor, manifested in *trying* to answer the question; which, however, he has not succeeded in doing. I know perfectly well that a tooth may be assisted in its development. That is nothing very new to any of us, I fancy. Neither would it be new if a certain kind of apparatus had assisted in developing a tooth or two; but when I find a whole set of molars and bicuspids too short and the antagonism perfect in one case, and perfect save one bicuspid or cuspid in the other case, it becomes a question of a very different kind, and there are but three gentlemen who have suggested what seems to me a feasible plan for rectifying the difficulty. I confess I am not sufficiently confident in going forward with either of the cases yet. I ask in all earnestness, therefore, if any of the gentlemen present have had any experience with such cases? if any gentleman can give me any light upon the subject, not only for my sake, but for the sake of others who may come across such difficulties? These children are both little girls, one about thirteen and the other about fifteen and a half, both undersized, both lacking development throughout the entire system. The difficulty, as I see it, is to get a point of support while this work of development is being carried forward. Now, you will say it is a mere matter of invention and mechanical difficulty. Very well, I shall be most happy if any one will suggest the mechanical means of overcoming it.

Dr. Charles Miller, New York. I have a case where the teeth, according to my understanding of the description, were very much as Dr. Bogue describes it. The under front teeth struck against the gum back of the upper ones. The articulation was good, and I put a plate in, letting the under front teeth strike on the plate, and kept it so for some time. I kept it on until now the under front teeth do not touch the gum by certainly three-sixteenths of an inch. It has been something like a year. I think the boy was about fifteen or sixteen years old. And then, in order to throw the under jaw forward, I made an inclined plane for the under teeth to strike on, and it has helped his mouth very much indeed. That was done through the suggestion of Dr. Kingsley.

Dr. Kingsley. I do not remember the case of Dr. Bogue's distinctly. It is mixed up with many others of a similar character, and I cannot answer with certainty. I will attempt, however, to say a word or two in reply to Dr. Atkinson. His remarks call up the old saying, "A half truth is worse than a falsehood." Unless one has had an experience which would enable him to take what Dr. Atkinson says and discount it, he would certainly be misled.

You cannot drive teeth this way and that with the facility which his words imply; if not a mechanical impossibility it is an imposition upon the patient. His words do not take into consideration the cause or origin of the trouble at all.

That we can move teeth with great facility I think my own experience abundantly proves, but that we are justified in moving all irregular teeth is quite another thing.

There are many presentations where it is desirable to shorten the teeth; to push them back or to move them in various ways, where it would be the height of folly to undertake it; cases where great mechanical difficulty even might be overcome, but in five years the patient would be worse off than when you began.

In regulating teeth there is always danger; and the matter cannot be treated in a flippant manner. There is always an objection to regulating teeth when fixtures have to be worn any length of time. No matter how carefully adjusted or how much attention to cleanliness they receive, the mouth is always better off without fixtures of any kind. I have no doubt there are many cases where teeth have been impaired in their structure quite as much by wearing such fixtures as they have been benefited in appearance.

Again, there are inherited peculiarities of a kind which may be overcome by mechanism, but where the tendency to return to the inherited type is always present and will sooner or later assert itself. It is but a question of time when the moved teeth will assume the same position they would have been in if they had not been interfered with. These remarks apply to the cases which have been alluded to to-night. It is not impossible to drive teeth up into the jaw and thus make them shorter. I have done it in several instances; but a great discrimination is needed or the effort will be entirely lost in its ultimate beneficial results.

The prognosis of regulating teeth does not rest upon a solution of the mechanical difficulties.

Dr. Bogue. One word more to continue a course of remarks which Dr. Kingsley has begun. One of the patients whose cases I have presented here this evening is a young girl, and is a member of a family where I find every child has irregular teeth, so far as I have seen them; the next youngest child, a brother, is in the condition mentioned by Dr. Kingsley; the molars touch, and not a tooth forward touches. I am inclined at this moment to believe, that if I undertake anything less than the extraction of probably three teeth, —I say three, not four,—I should make a mistake, and I should do the patient quite as much, or more harm than good. These cases I first asked about; as I don't get light thus far, perhaps I may get it by stating what I have begun to do, tentatively, partly at the suggestion of our worthy president, and of Dr. Kingsley, and of other gentlemen who coincided with my views. I have put oxyphosphate of zinc in the grinding surface cavities of the sixth-year molars, and I have in this manner propped the mouth open about one-sixteenth of an inch, and that relieves the pressure of the lower incisors upon the upper gums, while I make an effort to elongate the bicuspids and twelfth-year molars. Another family comes along in which one of the children has such projecting incisors that she is unable to close the upper lip. Dr. Kingsley was the only man I found among those whom I consulted who suggested or hinted at an idea I had in my own mind, viz., the extraction of the lateral incisors. I extracted them. The case was in last week. The cusps of the cuspid teeth have been cut away so that they represent lateral incisors, and a casual observer would never notice that there had been any irregularity whatever. I might in this case have made a formidable operation and a great bill, and at last have left the teeth in a crowded, jumbled condition that would have produced decay in after-life. But I looked forward so far as possible to her future life. The young lady is about fifteen or sixteen years of age now. I did that which I positively believe will leave her with more teeth, better looking and better teeth, at forty years of age than if I had adopted any other course. Her sister comes in, and what is the condition there? Exactly the opposite. While the upper lip could not shut in the first instance, in this case the lower teeth projected; and it is a curious anomaly to find a projecting upper jaw in one sister and a projecting lower jaw in the other.

Dr. Hill. What is the parentage?

Dr. Bogue. American, both sides. Certainly for two generations back the parents are American. Whether any gentleman has considered this subject to such an extent that he can lay down a positive rule and say, "do that," I do not know. Judging from the looks of my closet-shelves, filled with plaster casts, I have had a good deal of experience and some little success at regulating teeth, and yet I confess

I don't know all about it, and these two cases puzzle me. I don't like to take a step, even experimentally, unless I think I can see the opening beyond at which I shall come out without loss, and the only light on this subject thus far is what I have suggested as the result of these various inquiries, viz., propping the mouth open and keeping it there until the teeth are elongated. Some suggest a celluloid plate, others some other kinds of apparatus, to keep the mouth open while trying to develop the evidently not fully erupted bicuspids and molars. But if there is any other appliance than those mentioned that will do the thing better, I shall be very glad to hear of it. The principles underlying all of this class of cases are the same, whatever appliance is employed for the individual case.

Dr. Hill. Mr. President, there is a little apparatus on your table for heating gutta-percha which I have used in my practice, and find very valuable. Its inventor, Dr. Oliver, is, I believe, present. He has also devised a preparation of gutta-percha which, so far as I have used it, pleases me very much.

Dr. Oliver. I have experimented for a number of years, using a great deal and giving a good deal away. I tried to make a gutta-percha that was more durable than others. Some say it is hard to work; with me it is not so. It is not sticky in my hands, and with a little care it will give satisfaction, I think, to every one. It will not shrink from the walls of the cavity, as most gutta-percha does, provided it is not overheated, and it is more difficult to take out than any other. I also think that it will prove more durable. This gutta-percha I have does not require so much heat as others. That is the simplest apparatus I could get up, and it affords the only proper way to heat gutta-percha.

Dr. Northrop. It is a very excellent gutta-percha for use on the grinding surface of the teeth.

Dr. Rich. I have been using Dr. Oliver's gutta-percha, and of all I have been able to try it is the toughest and strongest. I have tried it in several cases where it has had severe usage, and it preserves its form and is remarkably tough, and the great difficulty is to get it out of a cavity if you wish to. For a permanent filling it is the most valuable preparation of gutta-percha I have ever seen, and I think the matter of plastic filling is a very important one.

Dr. La Roche. I have used Dr. Oliver's heater for some time, and I find it a very excellent apparatus.

Dr. Atkinson. I have two incidents I wish to mention, in the hope to serve young men who have not studied all that belongs to the laws of morphology, and will kindly accept a fatherly suggestion, how to behave under certain circumstances. Two children,—twins, a boy and girl,—the product of an Irish father and a Scotch-English mother, who will be six years old in August, were present to-day with irregular temporary inferior dentures. In the case of the boy the first and second temporary molars strike directly upon the inner cusp of their opposing teeth in the lower jaw, and there is a truncated elliptical space between the incisors in front when the mouth is shut. That was the principal irregularity in his mouth, and I was asked whether it would be desirable to deal with it at all until the permanent teeth began to make their appearance. The other one, the girl, had the occlusion of the grinding teeth very nearly correct, but the incisors and cuspids caught the lips between them when the mouth was shut, and projected slightly at the mesial line between the superior central incisors. I made inquiries with a view of learning if there was any reason to expect a similar derangement of the coming permanent teeth. I advised that the temporary molars, which were too large, should be cut down until the occlusion was corrected, and thus accommodate the permanent molars coming next August; not to interfere with the front part of the mouth at all. In studying it over I asked, Had there been any undue use of the front teeth? Had there been thumb-sucking? and got negative answers; but the mother said that she used to put sugar in a cloth and let them suck it. That is the kind of heredity that raised the mischief there, and is raising the mischief everywhere.

Dr. Bogue. I have lately come across a case of that sort. It was not a sugar-teat, but another kind that caused the mischief. Dr. Atkinson has almost described the case—if he had said permanent instead of temporary teeth—that troubled me this afternoon. It is a case of American parentage on one side, German on the other, and there has never been thumb-sucking or sugar-teat-sucking. The upper lip cannot be closed, except with great effort.

Dr. Rich. What is the object of the inquiry about the parentage?

Dr. Atkinson. I have noticed that in the different nationalities there is a distinct difference between Scotch, English, and Irish teeth, and when they are mixed I have sometimes seen English teeth in Scotch or Irish jaws, etc., and it is for the purpose of getting at such facts that the question is asked—a true morphological question.

Dr. Kingsley. If anybody should ask me what I meant by it, I could tell very plainly. It is a part of my diagnosis of the origin of the trouble.

I do not care whether the child is of English, Irish, or German parentage, or any other nationality. If I see in one parent a peculiar contracted arch, and in the other a broad one, and I see in the child peculiarities that might arise from the mixing of those types, it would probably influence my prognosis.

Dr. Brockway. Do you recognize any national types?

Dr. Kingsley. I do not think that among the class of people we come in contact with we can discover any distinctive American type. We can easily see the types of other and unmixed races. As a general rule the uncivilized races have the broadest jaws, and the tendency of civilization seems to be towards their narrowing. So far as I am observant, civilization or higher intellectual development never shows a tendency to increase the width of the jaw. The tendency evidently among civilized races is to the narrowing, certainly not to the widening. That is only a general statement, and in this country probably more than in any other we find the largest variety in the shape of the dental arch, from the widest to the narrowest, and when you mate two people, one with the wide jaw and the other with the narrow, it may possibly be the cause of irregularities in the children,—that is why I make an inquiry into the parentage.

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Adjourned.

PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY THEODORE F. CHUPEIN, D.D.S.

At a meeting of this association, held on the evening of September 9, 1879, Dr. W. H. Trueman, by request, made a verbal report of some of the proceedings of the State Dental Society at Delaware Water Gap. Among other things he exhibited a sample of Dr. McClelland's medicated stopping, which was a preparation of gutta-percha combined with a minute portion of arsenic and other drugs. It is intended for obtunding the sensitiveness of dentine. When the dentine is so sensitive as to preclude thorough excavation, the cavity of decay is to be superficially prepared, and the material placed therein to be left for two or three days, after which it is claimed that the decay can be excavated painlessly. He said, the question was asked, Can arsenic be used in a cavity so as simply to obtund the sensitiveness of the dentine without endangering the pulp; to have it go just so far and no farther? If, by using a minute quantity, the extent of its action can be controlled, why not use the homœopathic preparations, which are said to contain a definite and yet so minute a quantity that only the most delicate chemical tests will detect it? He spoke also of the clinic of Dr. Webb and his insertion of a lateral incisor attached to the central incisor and cuspid adjoining,—both pulpless teeth. There being no root for an attachment, these teeth were made to support the artificial crown by means of a wire soldered to it, and extending from it and fastened into the nerve-cavities of these adjoining teeth. The operation was performed entirely with the electric mallet, consuming some four or five hours' time in its execution. The operation was similar to that illustrated in the Dental Cosmos for September, 1879, page 497.

Dr. Peirce stated that the operation, although beautifully performed by Dr. Webb, was not original with him, but had been done some years ago by Dr. B. J. Bing (now of Paris, France), in that case the attachment being made to two vital teeth. See Dental Cosmos, vol. xi. (1869) page 509.

Dr. Buckingham said the operation might be admissible in a case as performed by Dr. Webb; but it was questionable whether it was admissible to make attachment to teeth not deprived of their vitality. This binding of several teeth together did not seem exactly right, merely for the sake of avoiding the necessity of a plate for the support of such teeth as were lost.

Dr. Peirce spoke of the effort made to form a national dental association, the plan having been set forth in an article by Prof. Winder in the Dental Cosmos for September, 1879.

Dr. Trueman spoke of Weston's Insoluble Cement. He regarded the last put on the market—which was slow setting—more favorably than that which was first offered. He related a case where he had used this (the quick setting) material with excellent success in the case of pivoting a front tooth. The hole in the artificial crown did not correspond with the hole in the root, but otherwise answered admirably. He bent a small piece of gold wire so as to make it accord with the hole both in the root and artificial crown. He fastened the wire in the root with this cement, applying the crown at the same time. It was done very quickly, after all things were prepared and at hand. He had seen the case several months afterwards, and found it doing well.

Dr. Peirce showed a filling material with which he had been experimenting considerably. It was very hard, had a good polish, and was very nearly the color of a natural tooth. He said it was easily made, and that any color could be given to it. It was composed of oxide of zinc and glacial phosphoric acid,—the former being the powder, the latter the liquid. It is made as follows: the oxide of zinc is put in a crucible and heated to a deep red color, and kept at this temperature for two hours, after which it is pulverized in a mortar to a very fine powder, the finer the better. The liquid is phosphoric acid dissolved in as small a quantity of water as is necessary to take it up, then boiled, the excess of water passing off, leaving the liquid of a thick, clear, oily, or syrupy consistency. The smaller the quantity of water in the liquid the slower will be its setting property. Dr. Peirce mixed some of the preparation, which formed a very plastic mass, which could be manipulated for six or eight minutes before it set.

Dr. Daniel Neall spoke of some plastic fillings of Weston's Insoluble Cement, inserted by his associate, Dr. Musgrove. They had been inserted three or four months ago. He had seen them lately, and they were doing admirably. He had also inserted this cement for a very young patient. It was a most unfavorable case, both as regarded the patient and the character of the teeth, but was very successful and satisfactory.

Dr. Peirce had used oxyphosphate for capping pulps, and had been very successful with it. He said that, in cases of sensitive dentine, he had used the liquid with very marked success. It was placed in the cavity, which was first made as dry as possible. After the lapse of two or three minutes the cavity could be prepared almost without pain. In answer to a question whether the material would soil the fingers, as some such preparations do, he said he had not found this to be the case.

A case was related of a central incisor which had the corner broken off, and had been filled with Weston's Insoluble Cement (the slow-setting). The gentleman, who is a dentist, stated that he had not spared the filling either in biting, chewing, or brushing the tooth, yet it exhibited no appreciable wear.

Dr. Buckingham said, regarding the liquid used with the preparation presented by Dr. Peirce, that he could not speak with authority as to the propriety of using it as a pain obtunder, or the influence it exerted on the dentine. The liquid was a powerful acid; it might be antiseptic or not. This could be tested. The oxychlorides and oxyphosphates seemed destined to supersede amalgam. They certainly had the advantage of it in color, and their density seemed quite as good. The facility with which they could be manipulated also commended them to use.

At a meeting of the association held on October 14 the following officers were chosen to serve for the ensuing year, 1879–80:

President.—Dr. J. H. Githens.

Vice-President.—Dr. Spencer Roberts.

Recording and Corresponding Secretary and Reporter.—Dr. Theodore F. Chupein.

Treasurer.—Dr. William H. Trueman.

Librarian.—Dr. M. L. Long.

Committee on Membership.—Drs. T. L. Buckingham, Amos Wert, and E. H. Neall.

ODONTOGRAPHIC SOCIETY OF PENNSYLVANIA.

REPORTED BY JOS. R. C. WARD, D.D.S.

A STATED monthly meeting of the society was held on Wednesday evening, October 1, 1879, at the Philadelphia Dental College. Dr. J. Lehman Eisenbrey, president, in the chair.

Dr. Stellwagen presented a tooth filled with gold by Dr. Burdell, of New York, in 1837, which was finally extracted in 1878, with filling still good, showing forty-one years' good service. Dr. Stellwagen also exhibited an incisor that he had transplanted in 1875, removing it from one patient on account of the crowded condition of the teeth, and transplanting to another patient, in place of a diseased root, showing that although inserted under very unfavorable circumstances, it had become firm and done good service for four years and three months, until extracted for the insertion of an artificial denture.

Prof. Stellwagen then read a short paper prepared by Dr. H. E. Pflueger, of Germany, on "Excision of the Exposed Pulp" and "The Reproduction of Pulp-Tissue," of which the following is an abstract:

". . . While in Rotterdam, Holland, I first performed the operation of excision of the exposed portion of a pulp that was protruding through the opening from the pulp-chamber into the cavity of decay. The operation proved so successful that I have frequently repeated it. Out of at least two dozen operations of the kind, I do not know of one in which the pulp died. I have seen most of them since for the purpose of capping. Saw several of these patients from one to two years afterwards, and found the teeth perfectly healthy and sound, presenting every appearance of having living pulps.

"The teeth operated upon were mostly bicuspids of the superior jaw, but some were in the lower,—two canines and one central incisor. The last named three months afterwards was found with the pulp alive upon removing the gutta-percha cap. I cut from the distal surface of a right superior central incisor through the pulp-chamber, removing with a sharp drill (made by grinding down an ordinary engine bur) the lower half of the bulbous portion of the pulp. Then washed the cavity with warm water until the hemorrhage completely ceased; then placed a small pellet of cotton slightly moistened with creasote over the pulp, and plain cotton in the cavity, taking the utmost precaution not to produce pressure or give pain. Two days later I removed the dressings, and placed a small capping of gutta-percha, made soft by heat, over the pulp. I filled the tooth over this with oxychloride of zinc. After two or three months I removed everything from the cavity, and filled the tooth with gold over a new capping of gutta-percha. The gold filling was inserted in July, 1876, and up to August, 1877, it had not given the slightest pain, although in the mean time several other teeth had so far suffered from caries as to require fillings. . . .

"In this connection I may add that it has frequently been my experience, in a few weeks or months after cutting out living pulp (with a drill attached to the burring engine), to find upon examination of the roots (after cutting off the crowns preparatory to inserting artificial teeth) that they were filled with pulp-tissue, the projection of which was pressed upon by the plate, and caused pain so severe as to compel me to repeat the operation,—in one case even requiring a third removal,—and to avoid further trouble from it the root was filled with cotton and creasote for some weeks, and finally a piece of pivot-wood was driven in, after which no further growth of the pulp took place. Previously contact with the tongue had given acute pain.

"On one occasion, after destroying the pulp of a superior molar with arsenious acid in the usual form of nerve paste, with creasote and morphia, the patient objecting to filling, I cleaned out the débris of the pulp, and placed a pellet of cotton in the cavity of decay. About four or five months after, the gentleman returned complaining of toothache, and upon examination I found the pulp-cavity filled with a living pulp, which was acutely sensitive to the slightest touch of an excavator. Doubting the possibility of a fresh growth of the tissue, I examined it critically with mirror and by touch, both of which compelled me to acknowledge its presence. I again applied the paste, and then, at the consent of my patient, filled the tooth. . . ."

Dr. Stellwagen took great pleasure in vouching for the ability of Dr. Pflueger, who, he thought, was competent to judge, very cautious to act, and still more cautious to assert.

Dr. Trueman did not doubt but that there might be growth, but thought it merely fungus growth, and doubted that true pulp-tissue could be restored to its full sensitiveness.

Dr. Kingsbury said the practical question is, that when we find an exposed pulp, shall we treat as described in the paper? Our knowledge is so imperfect that he looks upon it as a very precarious practice. To extirpate, remove, and fill the cavity he thought the surest and most successful way to treat exposed pulps and pulpless teeth. He should hesitate to treat as the essayist does, but would sometimes, instead of using arsenic, give ether, and extirpate with instruments. Success in extirpation is more uniform by instruments than by arsenical application. He thought the essayist might be more successful with his patients than we would be with ours, as the Germans are more phlegmatic, and would submit to such treatment, but Americans would not.

Dr. Dorr thought it very strange that so valuable a tissue as the pulp of a tooth could not reproduce itself, as we know other parts of the body do. He deprecated the practice of destroying all pulps, and admitted that the great trouble was that the patients would not submit to the treatment necessary to save them. He felt convinced that in many cases they could be saved where they are now destroyed.

Adjourned to meet on Wednesday, November 5, 1879.

EAST TENNESSEE DENTAL ASSOCIATION.

The thirteenth annual meeting of the East Tennessee Dental Association was held at Morristown, Tenn., Tuesday, October 14, 1879.

The following officers for the ensuing year were elected:

President.—S. M. Prothro, Chattanooga.
Vice-President.—R. A. B. Moyers, Pikeville.
Recording Secretary and Treasurer.—A. W. Palmer, Kingston.
Corresponding Secretary.—J. C. Stephens, Rogersville.

Drs. Cook, Palmer, Stephens, and Prothro were elected delegates to American Dental Convention. Drs. Speck, Carson, Lee, and Moyers were elected delegates to National Dental Association.

Chattanooga was selected as the place for the next meeting, first Tuesday in August, 1880.

T. J. Speck.

BROOKLYN DENTAL SOCIETY.

This society held its twelfth annual meeting on Monday evening, October 13, 1879.

The following were elected officers for the ensuing year:

President.—Charles D. Cooke.
Vice-President.—E. H. Dickey.
Recording Secretary.—C. P. Crandell.
Corresponding Secretary.—W. H. Atkinson.
Treasurer.—W. A. Campbell.
Librarian.—I. C. Monroe.

C. P. Crandell, *Recording Secretary.*

MERRIMACK VALLEY DENTAL ASSOCIATION.

At the annual meeting of the Merrimack Valley Dental Association, held at Manchester, N. H., November 7, 1879, the following gentlemen were elected officers for the ensuing year:

President.—Dr. T. H. Chandler, Boston, Mass.
First Vice-President—Dr. C. H. Osgood, Boston, Mass.
Second Vice-President.—Dr. C. W. Clement, Manchester, N. H.
Secretary.—Dr. H. W. Coburn, Lowell, Mass.

Treasurer.—Dr. G. A. Gerry, Lowell, Mass.

Librarian.—Dr. G. F. Waters, Boston, Mass.

Executive Committee.—Dr. R. R. Andrews, Cambridge, Mass.; Dr. E. S. Powers, Brockton, Mass.; Dr. C. G. Davis, New Bedford, Mass.; Dr. Leon Rideout, Lynn, Mass.; Dr. William Jarvis, Claremont, N. H.

H. W. Coburn, *Secretary.*

CENTRAL PENNSYLVANIA DENTAL ASSOCIATION.

The Central Pennsylvania Dental Association will meet at Huntingdon, Pa., Wednesday, January 7, 1880, at ten A.M.

J. C. M. Hamilton, *Secretary.*

CORRECTION.

In the list of Licentiates in Dental Surgery of the Royal College of Surgeons in Ireland, published in the Dental Cosmos for October, one or two errors occurred, caused by misprints in the copy sent us. Attention is directed to the following:

For Edward James Grey, Cheltenham, read Edward James Gregory, Cheltenham.

For Frank Alexander Hunt, Manchester, read Frank Alexander Huet.

BIBLIOGRAPHICAL.

The Throat and the Voice. By J. Solis Cohen, Lecturer on Diseases of the Throat and Chest in Jefferson Medical College, etc. Philadelphia: Lindsay & Blakiston, 1879.

This volume, the sixth in the series of the "American Health Primers," is devoted to a consideration of the anatomy and physiology of the throat; to directions as to its general care; to the causes which lead to its disease, and to advice regarding the various affections to which it is liable. The second part treats of the voice, its improper use, its proper culture and care, etc. The book cannot fail to repay intelligent perusal.

The Physician's Visiting List for 1880. Philadelphia: Lindsay & Blakiston.

The issue for 1880 of this convenient Visiting List is its twenty-ninth annual appearance. This fact alone is evidence that it meets the needs of physicians. A valuable addition has been made in the present edition of a very full posological table, in which the doses are expressed in terms both of the apothecaries' and the metric system of weights and measures.

PUBLISHER'S NOTICE.

CLOSE OF THE VOLUME.

THIS number completes the Twenty-first Volume of the DENTAL COSMOS.

The first number of the Twenty-second Volume will be issued January 1, 1880, and succeeding numbers on the first of each month following.

The average monthly edition during the year has exceeded six thousand copies, and the total number of pages of reading matter in the volume which this number completes is seven hundred and four.

As to the value of the material which has thus been presented to the dental profession throughout the world, the readers of the journal must decide.

As to the future, the publisher assures subscribers that no effort will be spared to make the volume for 1880 at least equal to its predecessor, and as much better as possible. Certainly it will continue to be a *dental* journal,—the contributions and selections having constant regard to the purpose of publisher and editor, viz., to make it indispensable to every intelligent dentist on the globe. To such position, indeed, it may truthfully be said to have already attained, its subscription list including the name of nearly every operator of any note, not only in all the States and Territories of the Union, but wherever throughout the world an English-speaking practitioner of dentistry is found.

The coming volume will be under the editorial management of Dr. J. W. White.

We ask that renewals and new subscriptions be sent in promptly, that we may with greater certainty determine the size of the edition required.

SAMUEL S. WHITE.

THE DENTAL COSMOS FOR 1880—PREMIUM OFFER.

THE publisher calls attention to the announcement in our advertising pages of a small work on "The Mouth and The Teeth" as the Premium for subscriptions to the Twenty-second Volume of the DENTAL COSMOS, the first number of which will appear January 1, 1880.

The volume is now ready for delivery. It will be sent, postage paid, to all who remit the cash ($2.50) for the Twenty-second Volume of the DENTAL COSMOS before February 1, 1880.

SAMUEL S. WHITE.

HINTS AND QUERIES.

"He that questioneth much shall learn much."—BACON.

CORRESPONDENTS desiring a reply in this department are requested to make use of *distinctive signatures or initials*, and avoid the practice of signing their communications Reader, Subscriber, etc.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names. We cannot insert queries or replies except they are so accompanied. Names not necessarily for publication.

I HAVE a patient whose inferior incisors are somewhat tender, and upon pressing upon the gums around them there is a discharge of pus from the vicinity of the roots. What is the most approved treatment?—A. B. C.

REPLY to "Morse," who, in the DENTAL COSMOS for October, asks the following question: "Will some reader please inform me the reason of gold fillings crumbling and turning black at the edges? Also, what kind of instruments and gold to use to prevent it?"

This result, which is unpleasant to the practitioner and unsatisfactory to the patient, is no doubt due in part to impure material; for a great deal of the gold in the market is alloyed with copper, which causes a filling of it to discolor proportionately. Sometimes it is due to improper manipulation. To prevent this we would advise: First, use none but the purest gold; second, be more careful in preparing the walls and edges of the cavities. Let the anchorage be as far from the surface as the welfare of tooth-structure will permit, so that you may better afford to cut the enamel, avoiding sharp angles and thin, frail margins. In filling, as you approach the enamel, be very sure you do not allow your serrated points to come in contact with it with sufficient force to cause it to crumble, and thus expose the edges of the filling, making a fissure through which the various fluids of the oral cavity will enter. Some might advise you to use smooth points; but I use "serrated" points; though I am very careful not to crush the edges of the cavity.—O. B. LOVE.

IN reply to "Morse," in the October number of the DENTAL COSMOS, I have found that, when fillings turn black at the edges and crumble, it is caused by defective manipulation. In shaping the edge of the cavity, my plan is to have it perfectly smooth, and I cut away the thin, frail edge until I strike firm, healthy, and strong enamel. In filling the cavity, when I come to the edge, I use slightly-annealed cohesive foil. I find No. 4 best for this part of the filling. I let it cover the edge well, and lightly press it down on the edge. I add two or three pieces, and then condense thoroughly with a finely-serrated Varney or Atkinson point, either mallet or hand-pressure, and in finishing dress down and burnish towards the edge of the enamel,—never from it. By this method I find my fillings perfect, with no black edges after years of wear.—T. M. ALLEN.

AGREEABLY to request, I send a description of the method of inserting gutta-percha fillings which has given the best satisfaction in my own experience.

When the cavity is prepared in the usual way, apply to the surface against which the filling is to rest chloroform in which a little Canada balsam, previously dried to a hard mass (twenty-five grains to a fluidounce of chloroform), has been dissolved. Then insert the filling against the walls, using an instrument sufficiently warm when more than one block is required for the filling, to pack the blocks together firmly. The filling should extend from the bottom to a little above the walls of the cavity. Then, with a suitable instrument, which has been chilled by standing in ice-water and wiped dry, pack the entire mass firmly down. This will so harden the surface and fix the filling to the walls of the cavity that it can be safely cut to the desired form. As a final finish, take fine tape moistened with chloroform, and, placing it upon the surface of the filling, move it slightly in various directions. This will remove all roughness from the face of the filling and overlapping portions remaining on the walls of the tooth, and leave a very smooth and agreeable surface for contact with the tongue. The surface may be gone over with a moist burnisher, but this will usually add nothing to the perfection of the operation. Fillings inserted in this way cannot leak or fall out, although the cavity be very imperfect in form.—A. M. HOLMES.

I HAVE just read an article in the *Dental Advertiser* for October on "Preparation of the Mouth for Artificial Dentures," by Dr. Lauder, of Montreal. He gives the following advice: "After extraction, where roots have been ulcerated and pus has discharged, the patient should be instructed to rinse the mouth thoroughly several times a day with water as hot as it can be borne; and, indeed, the hot water after extraction, used frequently, is one of the most useful applications to reduce inflammation and tenderness."

How different our ideas on this subject! I have always instructed my patients to take nothing hot into the mouth, but to rinse the mouth frequently, with cool or cold salt-water, or a solution of alum in cold water. In no case, no matter how much the gums were diseased or lacerated by extraction of teeth, did I ever hear of any complaint of after-trouble, except when the instructions were disregarded.—WM. A. MILLS, D.D.S.

DENTAL HEMORRHAGE.—I keep a piece of the very finest, softest sponge, which I wet, and dry under pressure.

In a case of hemorrhage after the extraction of a tooth, I cut off a piece about one-half the size of the crown of the tooth, and having first rubbed the side to be inserted with a little nitrate of silver I dip it into tannin; then with the point of an instrument press it into the socket, and hold it there until it is saturated. It immediately adheres to the walls of the cavity, and if properly inserted will remain until it needs to be taken out. I have used this treatment over twenty years.—E. H. DANFORTH.

THAT the operation of replantation of a tooth after extraction is not a new procedure, is shown by the following extract from an old volume entitled "A Practical Essay on the Human Teeth," by Paul Eurialius Jullion, London, 1781:

"When there is a cavity formed on the side of a tooth, by caries or decay, which cannot be filled up on account of its being inaccessible while the tooth remains in the head, it is advisable to take it out, and stop up the cavity; when this is done, and the tooth properly replaced in its socket, it will, with due care, become as firm and serviceable as ever, provided the patient be then in health." —W.

GINGIVITIS OF PUERPERAL WOMEN.—In the hope that it may prove as useful to others as it has in my hands, I desire to state that for this troublesome affection I have employed with satisfactory results the glycerole of tannin, touching with it the affected gums twice daily.—T. M. U.